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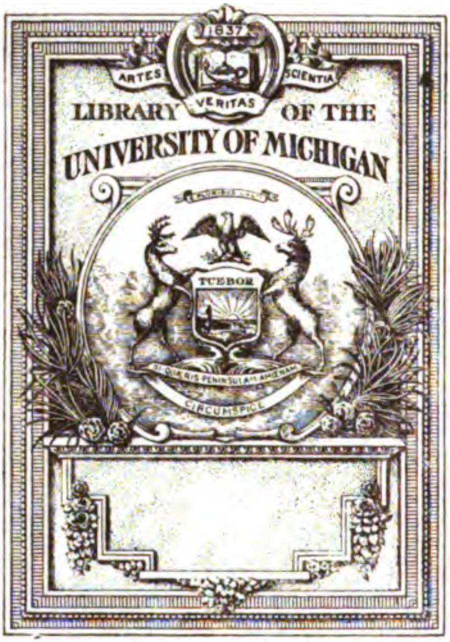
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(Assisted by several Scientific Gentlemen.)

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LIST OF PLATES IN VOL. XXIV.

[CONJOINED SERIES.]

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III. Betts and Taylor's Machinery for Making Bricks; Mechi's Improvements in Lamps; and Ranwell's Registering Apparatus.

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No. CXLVI.

RECENT PATENTS.

To William Kenworthy, *of Blackburn, in the county of Lancaster, cotton-spinner, for certain improvements in machinery or apparatus called "beaming or warping machines."*—[Sealed 11th March, 1843.]

These improvements in machinery or apparatus, called "beaming or warping machines," relate particularly to the machines now commonly employed in cotton and other woven manufactures, for the purpose of winding the threads or yarns from the bobbins upon which they have been spun, on to a roller or beam, prior to their being stiffened or dressed, preparatory to placing them in the loom for weaving, wherein they are intended to constitute the warp-threads or yarns.

These improvements consist, Firstly,—in the application of suitable mechanism to the ordinary beaming or warping machine, for the purpose of reversing the motion of the beam or roller, upon which the yarns are being wound by power, in the event of a thread or yarn breaking; in order that the broken ends may be readily found, and again united or tied up, to make the warps or yarns perfect; this necessary reversing of the beam or roller having hitherto been done by the hands of the workman, and with a considerable expenditure of time and labour; and Secondly,—these improvements consist in the application and arrangement of other suitable mechanism, to be used in the said machines, either in conjunction with the reversing apparatus, or separately and unconnected therewith, for the purpose of "taking up the slack," or preserving the tension of all the unbroken threads, which would otherwise be left loose between the beam and the bobbins, (as the beam is reversed) whilst the unbroken threads are being tied up. This requisite operation has also hitherto been performed by the hands of the workman; and is, by the present improvement, accomplished by self-acting machinery.

As the action and use of the beaming or warping machine is well understood by persons conversant with the manufacture of woven fabrics, it will be only necessary to describe the application of the above-mentioned improvements, and their mode of operation, in connection with such machines.

The drawings in Plate I., represent, in several views, an ordinary beaming or warping machine, with the improvements applied thereto. Fig. 1, is a front elevation of a warping or beaming machine; fig. 2, is an end view; fig. 3, a transverse section; and fig. 4, a longitudinal section, both taken vertically through the machine. The framing *a, a, a,* supports the reed *b, b,* the distending-rollers *c, c,* and the tension-rods and wires *d, d,* over which the warps, yarns, or threads *e, e, e,* pass, as they proceed from the creel of bobbins behind, not shewn in the drawing; these warps, yarns, or threads, pass onwards to be wound upon the beam or roller *f, f,* ready for the subsequent process of dressing and weaving. The roller or beam *f, f,* is caused to revolve, and wind on the yarn, by friction of contact with the bed or bottom-roller *g, g,* on which it bears; this roller being driven by means of the ordinary driving-strap *h,* passing around the fast-pulley *i,* upon the roller-shaft *k.* In the event of any one or more of the warps, yarns, or threads *e, e,* breaking, in their passage from the bobbins to the yarn-beam, the improved apparatus comes into effect as follows:—Upon the discovery of a broken thread, the workman instantly turns, towards the left-hand, one of the handles *l, l,* which are fas upon the upper end of the vertical shafts *m, m*; and upon the lower ends of these shafts there are toothed segments *n, n*, taking into the racks *o, o*, formed upon the cross-shaft *p, p*. To the extremities of this shaft, strap-guides or forks *q, q*, are attached, which, on the handle *l*, being turned, instantly pass the driving-strap *h*, on to the loose pulley; and at the same time pass another reverse or crossed driving-strap *r*, on to the fast-pulley *s*, at the other end of the roller-shaft *k*, which immediately causes that roller, and with it the winding-on beam *f*, to turn in the reverse direction, and thus give back the threads, until the ends of the broken yarn or thread are tied up, so that the warping or beaming may proceed.

At this time it will be seen, that as all the threads are loosened, by the reversing of the rollers *f*, and *g*, it is necessary to take up the slack of the yarns or preserve their tension and order, whilst the broken thread is being repaired. For this purpose, the cross-rods *t, t, t*, lying over the yarns are provided, being similar to those in common use, excepting that these have small rollers upon their ends, bearing on the two side-rails *y**, (see fig. 2,) and are made to lower themselves by self-acting means, instead of being supplied by hand, as in common. As the handles *l, l*, are turned, for reversing the beam or roller *f*, small cams or excentrics *u, u*, upon the upright shafts *m, m*, shift the levers *v, v*, slightly, working on their fulcra *w, w*; the ends of which levers, by catching against the hooked end *x*, of the sliding-frames *y**, *y, y*, shift these frames just sufficiently to allow the first tension-rod t^1, to pass over the rounded end of the top or supporting-rails *y**, 'and descend in its groove *z*, by falling down which the tension of the threads is preserved. The sliding-frames *y, y*, run outwards on the rollers 1, 1, as shewn by dotted lines; allowing as many of the rods *t, t, t*, to fall into their grooves *z, z*, as the slack of the yarn requires; that is, the longer time the broken yarn is in being repaired, the greater is the amount of slack to be taken up, and, consequently, the number of rods to be lowered, one of which escapes the ends of the rails *y**, as it slides outwards, being gently pushed by the falling rod running down its respective groove *z*, and bearing against the vertical rail *y*, of the sliding frame. The broken thread being repaired, the straps and pulleys are again reversed, and the yarn or warp-beam is caused to turn in the direction for winding on; when the yarns, as they tighten up, will raise the tension-rods *t, t,* into their former position, and the counter-balance weights and chains 2, 2, passing over the pulley 3, 3, and attached to the sliding-frames *y, y,* will draw these frames backwards again into their former position, the upper rail *y**, passing under the rollers on the ends of the tension-rods *t, t, t,* and supporting them until they may be again required.

The patentee remarks, in conclusion, that any reversing motion may as readily be applied, for the purpose of enabling the workman to reverse the action of the yarn or warp-beam, as that of the crossed and open strap above described, such as those used in ordinary slide lathes, &c., which will be evident to any competent mechanic; and also that the action of the tension-rods may either be employed in conjunction with such reversing motion, or separately. He claims reversing the action of the yarn or warp-beam, by power, and the mechanism for working and employing the rods for preserving the tension of the yarns, threads, or warps, in "warping or beaming machines," when required, as above particularly described and set forth, whether such improvements be used separately or conjointly.—[*Inrolled in the Petty Bag Office, September,* 1843.]

Specification drawn by Messrs. Newton and Son.

To James Hamer, *of Wardour-street, engineer, for improvements in propelling vessels.*—[Sealed 19th January, 1843.]

These improvements in propelling vessels are three in number, and consist, Firstly,—in the use of air forced through metal pipes to the stern of the vessel, where, by its issuing against the water, the vessel is driven forward. Secondly,—in forcing air on the surface of water contained in horizontal trunks, lying longitudinally in the bottom of the vessel, by the pressure of which air the water is forced towards and out of the stern, and the vessel is thereby propelled forward; and, Thirdly, in a method of driving a propelling screw, of any of the approved kinds, by a rotary steam-engine, or wheel, similar to what is generally denominated Branca's Steam-wheel. The invention constituting the first improvement, is a new method of propelling vessels through water, by means of highly condensed air, forced through tubes, and acting directly upon the water. The air is compressed by means of condensing air-pumps, or cylinders, worked either by a steam-engine or any other power, into an air vessel or vessels, for the purpose of producing a continuous flow of air of nearly uniform density; and it is forced from the air-vessel through a tube or tubes, leading directly through the ship, parallel with the keel. At each extremity of the ship the said tube, if single, is divided into two separate branches, one on each side of the keel, and is brought out aft, either through the planking or substance of the ship's bottom in the run of the vessel; or if thought proper to carry them out further aft, the strength and substance of the stern-post is by no means reduced in consequence of the two tubes being brought out one on each side of the stern-post, and at the forward end one on each side of the fore foot; or a single pipe and nozzle may be brought through the stern and fore foot, without using any divided pipe. The main tube is divided by a three-way cock, so that the air may be entirely shut off, or allowed to escape either aft or forward. The ends of the pipes are furnished with nozzles, of such diameters as may be found most applicable to the size of the ship and power of the steam-engine, so as to cause the air to impinge upon the water with such a force and in such densities, as may produce the greatest effect in propelling the vessel through the water.

In Plate II., fig. 1, *a, a,* are two compressing air-pumps, worked by steam or other power; a^1, a^1, pipes of communication between the air-pumps and receiver *b,* for rendering the flow of air nearly uniform; this air-vessel is to be furnished with a safety-valve; *c,* is a three-way cock, for allowing the condensed air to flow towards the stern for propelling forward, or into the pipes leading forward for backing; or by being shut, prevents its escaping into either set of pipes;

d, d, is a metal pipe, leading towards the stern, for conveying air to the twin pipes or single pipe leading through the substance of the vessel or stern-post; *e, e,* are three stop-cocks, for allowing the air to pass direct to the stern, for propelling forwards; or to either of the lateral branches for steering, marked *f, f,* both at head and stern; *g,* is a similar metal pipe, leading forwards, to convey the compressed air to one or more pipes, passing out through or by the side of the fore foot to produce a backing motion, or a sideway movement for steering. The patentee does not confine himself to any particular disposition or arrangement of the several parts, or to any dimensions of pumps, pipes, or nozzles, except that he makes the orifice of the termination of the pipes or nozzles of such a diminutive diameter compared to the diameter or capacity of the compressing pumps, that the air being confined, except the small escape at the nozzles, will become of great density, and will therefore issue against the water with a considerable velocity.

The second improvement in propelling is intended chiefly for the use of canal craft, it being a method by which the disturbance of the water, to the injury of the banks, is entirely avoided, and is constructed in the following manner:—Immediately on the top of the floor timbers two trunks are laid, which reach from the bows to the stern, one above the other, slightly inclined upwards towards the bows. The ends of these, fore and aft, are brought out, one on each side of the fore foot and stern post. In the ends of the trunks at the bows there is a hinged valve or trap, opening inwards, which permits the water to enter and fill the trunks. In the ends of these trunks at the stern there is a stop, reaching from the top of the trunk to within one quarter of the height from the bottom, which allows the water to be forced out; and at the same time it prevents the escape of air until the water is forced down as low as the bottom edge of these stops. Connected with each of these trunks at the bows is an upright trunk, reaching above the load water-line of the vessel; these upright trunks are covered at the top with a plate, having openings for the admission of air into them, and also a passage for its escape into a blow-off trunk, on its having expelled the water. Above this plate is a sliding-valve, similar to the D valve of a steam-engine, to admit the compressed air into either of the trunks, and also to allow its escape. Over this valve an air-vessel is placed, which forms the valve box, and into it compressed air is to be forced by air-pumps, worked by steam or other power, as above described. The slide-valve is to be connected with and moved by the steam-engine, and a ready means provided for adjusting the time of its making its alternations, so that it may be moved either faster or slower than the steam-engine, according to the size of the pumps, power of engine, and speed of vessel required. On the water being forced out by the compressed air from one trunk, the slide valve will be moved by the steam-engine shutting off the compressed air, and allowing the air contained in that trunk to escape into the blow-off pipe, which trunk will be at the same time receiving water. Whilst the air is forcing out the water in the before-mentioned trunk, the second trunk is discharging its air through the blow-off pipe, and receiving water through the lower valve in the end of the trunk, to be ready for being emptied in its turn by the compressed air; so that the operation will be, that whilst one trunk is filling with water, the other will be emptying by the air being forced in alternately. Fig. 2, represents a general plan of this arrangement of trunks, valves, &c., on the bottom of the vessel; fig. 3, a longitudinal section of the same; fig. 4, is an enlarged section of the trunks at the bows; fig. 5, a section at the stern; and fig. 6, an enlarged section of vertical trunks. *a*, is the upper trunk; *b*, the lower trunk; *c, d*, the valves of the trunks; *e*, the upright trunks; *f*, the slide-valve and box; *g*, the air-pipe leading from the steam-engine; *h*, the air-vessel, supplied with air from compressing air-pumps, as before described.

The third part of the invention consists in combining a Branca's rotary steam-engine with a propelling screw, which steam-engine is worked by a small jet of high pressure steam issuing into a pipe of larger dimensions, leading to the circumference of the wheel, to which the axis of the said larger pipe forms a tangent. The nozzle which delivers the before-mentioned jet of steam, terminates in a cavity or enlarged part of the pipe leading to the steam-wheel, where there is an opening to allow the atmospheric air, either cold or heated, to rush into and mix with the steam, by which means a considerable quantity of air is drawn in with the steam, producing a powerful effect on the wheel; whereas the same quantity of steam alone would scarcely produce any useful result. This steam-wheel may generally be placed with its axis in the same horizontal line as the axis of the screw, with an intermediate shaft between the engine and screw; avoiding the necessity of any secondary machinery between the engine and screw, for producing a greater velocity in the screw than exists in the steam-engine. As the screw will by this means be driven much faster than is usual by any of the ordinary means, the diameter will be much less than any of those at present in use, compared to the size of the vessel; and in consequence of the advantage and convenience of having a small screw at a high velocity, it will in some cases be found desirable to place the axis of the screw lower than may be convenient for the axis of the steam-engine; in which case a "Hook's Universal Joint" is introduced at each end of the intermediate shaft of communication. Fig. 7, represents a longitudinal elevation of the engine, with the shaft of communication and screw; and fig. 8, is a front view of the engine or wheel. *a*, is the steam-wheel, having six blades or floats, although the number will be dependent on the size of the wheel, the vessel, screw, &c.; *b*, the intermediate shaft; *c*, *c*, the universal joints; *d*, the screw; *e*, the steam-pipe from the boiler; *f*, the jet nozzle for driving the wheel in the direction of the arrow *g*, or producing a forward motion of the vessel; *h*, the opening for the admission of air; *i*, *i*, steam-pipe; *j*, a three-way cock for admitting steam to either of the nozzles, or shutting it off from the engine; *k*, a steam jet and air entrance, as above, for driving the wheel in the direction of the arrow *l*, to cause a backing motion of the vessel; and *m*, a pipe for conveying away the steam from the engine in any convenient direction.

The patentee claims, Firstly,—using compressed air in the way herein described, as a means of propelling vessels; Secondly,—the use of compressed air, admitted alternately on the surface of the water, contained in trunks, as described; and, Lastly,—the combination of a screw propeller, intermediate shaft, universal joints, and rotary engine, as a means of propelling; but he does not claim the admission of air with steam, or any of the parts separately, as herein described.—[*Inrolled in the Rolls Chapel Office, July,* 1843.]

To ELIJAH GALLOWAY, *of Seymour-street, Euston-square, civil engineer, for certain improvements in the machinery for propelling ships and other vessels.*—[Sealed 25th May, 1843.]

THESE improvements consist, Firstly,—of improved methods of increasing the rate or velocity of the propellers beyond that of the axis of the steam-engine; and Secondly,—of an improved method of raising the propellers out of the water, and lowering them into their place, to be attached to the driving axis.

In reference to the improvement comprised under the first head, the patentee explains that it is requisite, in giving motion to screw-propellers, that their number of revolutions, in a given time, should be several times greater than that of the axis of a condensing steam-engine. Instead of getting such increase of velocity, by any of the ordinary methods of multiplying motions, he proposes to produce the same by the arrangements illustrated by figs. 1, 2, 3, and 4, in Plate II.

On referring to fig. 1, he says: "If these wheels revolve upon axes in the usual way, *a*, would make an entire revolution, whilst *b*, made only some portion of a revolution; but if *b*, instead of revolving upon an axis, be suspended upon three cranks *c*, *c*, *c*, of equal length, and the radii of which are respectively equal to one-half the difference between the diameters of the wheels (calculating such diameters from the pitch-lines); and if the whole apparatus be at first in the position indicated by the drawing, thereby causing *a*, to revolve, it will be found that the cranks *c*, *c*, *c*, and consequently their axes, will make three revolutions during the time that the inner wheel *a*, makes one revolution. So if the proportionate diameters differ, say as 2 to 3, or 4 to 5, or any other integral proportions, and the lengths of the cranks *c, c, c,* be determined, according to the rule I have given, then the cranks will always make as many more revolutions than the axis of *a,* as the diameter of the driving-wheel *a,* is to the difference between the diameter of the two wheels.

"But I propose, in most cases, as I have stated, instead of using toothed wheels, to adopt the arrangement shewn in figs. 2, 3, and 4, which I shall now explain:—Let it be supposed that three equi-distant points (*d, d, d,* fig. 1,) could trace their path upon a plate or disc, attached to *b,* and moving therewith, such path would be four epicycloids dotted thereon; and if to the points *d, d, d,* three rollers, of equal diameter, were affixed, then a figure, *e, e, e, e,* fig. 2, would be the tangent of the said rollers in every part of their path; or, in other words, the rollers would trace out the figure *e, e, e, e,* fig. 2; such being the case, it will be manifest that if, instead of toothed wheels, we adopt the arrangement shewn at fig. 2, where *d, d, d,* are the three rollers, affixed to arms, and revolving in bearings, and the figure *e, e, e, e,* whose interior curved aperture is generated upon the principle I have explained,—then, on motion being given to the main axis, the cranks, dotted at *c, c, c,* will make three revolutions for one of the main axis; and if the figure *e, e, e, e,* be accurately constructed, and the cranks truly proportioned, the action of the machine will be comparatively smooth and noiseless. In like manner, if the circles or wheels *a,* and *b,* be, in their diameters, as 2 to 3, the figure *f, f, f,* fig. 3, would be generated, and by attaching the two rollers to the axis, as there shewn, the velocity of the main axis would be to the crank axes as 2 to 1; or, if the diameter of *a,* and *b,* be as 4 to 5, the figure *g, g, g,* fig. 4, would be generated, and by constructing the apparatus, as shewn at fig. 4, the relative velocities of the main axis and crank axes will be as 4 to 1. I would further observe, that in whatever proportion the multiplication be effected, it is necessary that the number of the rollers and of epicycloids should be respectively equal to the number of times the generating circles can be divided by the difference between the two diameters. It will also be manifest, that the multiplication, effected by this method, does not admit of fractional quantities, but must always be in integral proportions.

"I must further explain, that if one propeller only is intended to be used, one only of the three crank axes must be prolonged for that purpose; but if two propellers are intended to be applied, then two of the crank axes should be similarly prolonged. It is further necessary to explain, that the arrangement of this contrivance may be changed by attaching the driving axis to the epicycloidal figure, and the cranks to the part to which the rollers are attached; in which case the proportion of the multiplication will be also changed, so that the cranks of fig. 2, would make three revolutions instead of two; those of fig. 3, would make four revolutions instead of three; and those of fig. 4, would make five revolutions instead of four."

When straps or bands are used, for the purpose of multiplying the motion of the screw-axis, the patentee proposes to adopt the following means, for preventing such straps or bands from slipping upon their respective drums or riggers: First pierce the periphery of the drums with a number of small holes, and into them screw or drive a number of minute steel pins, the points outward, and radiating from the axis; these pins must be from an eighth to a quarter of an inch above the surface, and have very fine points. The bands or belts must be lined with some woven or plaited texture, similar to the fabric used for horse-girths, which should rather exceed in thickness the projecting length of the steel pins, and must be sewed throughout to the belt or strap itself. It will be evident, therefore, that on motion being given to the drums, these pins will be forced into the fabric lining of the belts, and the tendency to slip will be opposed by the pins holding firmly therein.

The improvements comprised under the second head of the invention are represented at figs. 5, and 6. Fig. 5, is an isometrical perspective view of the after part of a vessel, with one of the propellers (for this improvement is only conveniently applicable where two propellers are used) in its place, and connected with the driving axis; and fig. 6, is a horizontal section of the bearings and screw. *h, i,* are two bearing-frames, firmly affixed to the vessel; *j,* is the screw-axis; and *w,* is the screw, which may be either of the form known by the name of the Archimedian screw, or any other propeller, the motion of which, through the water, is helical or spiral; *k,* is a bow, capable of turning freely on the axis, as will be seen by the section. To the enlarged ends of this bow there are attached two chains *l, l,* which pass through the apertures *m, m,* in the bearing-frame, and thence through a hawse-pipe *n,* and so on to the capstan of the vessel, or any other suitable purchase; observing that the said pipe shall be carried internally high enough above the water-line to avoid an influx of water. At the after end of the screw-axis is a collar *o,* to which is attached the shackle and chain *p;* the collar being sufficiently loose on the axis to allow it to revolve freely therein. The driving-axis *q,* is capable of being projected from or drawn into the interior, and its outer end is square or polygonal, fitting into the recess *r,* of the screw-axis, thus forming a coupling; so that when the axis *q,* is turned, the screw must necessarily turn therewith. The axis passes through a suitable stuffing-box, and when projected from within, has a short intermediate piece inserted between it and the preceding length, to form the coupling complete.

The method of detaching the propeller, and raising it out of the water, is thus described, with reference to fig. 5:—The intermediate length, in the interior, being first removed, then, by heaving on the chains *l, l,* the shaft *q,* together with the bow and screws, will all be drawn forward, until the after end of the axis is clear of the after bearing *s,* and rests upon the horns *t;* the after chain *p,* is then wound up, so as to raise the propeller to about an angle of 45°. The two forward chains *l, l,* are then slackened out, and the after chain wound up as nearly uniform as possible, so as to keep the screw-axis in a state of tension, and thereby prevent it shaking or rocking about in a sea-way; and this operation is continued until the end of the shaft is close up to the arm *u,* in which position the screw may be further secured.

To replace the screw, this operation must obviously be merely reversed, being first lowered by heaving up the chains *l, l,* until the ends of the bow *k,* rest upon the mouth-like cavities *m, m;* the after-chain is slackened out, until the after-end of the axis falls into and rests between the horns *t.* The shaft *q,* is then pushed outwards, until it is coupled to the screw-axis, and the after-end of the said axis is inserted into the after-bearing *s,* when the whole is ready to be set in motion by the engine.

Figs. 7, and 8, represent an improved paddle-wheel. It is well known that steam-vessels, when fitted with paddle-wheels, and deeply laden, cause such wheels to be inconveniently immersed in the water, and thereby to retard the motion of the engines, and consequently the speed of the vessel. To reduce the loss from this cause, the patentee proposes to construct the paddle-wheels (especially those intended for long voyages, and of varying cargoes,) as shewn in figs. 7, and 8. The wheel consists of four sets of arms and rims; two, *r, r,* fixed to the shaft, and two fixed to the hollow axis *s, s.* It will be apparent, therefore, that by moving the hollow axis *s, s,* all the parts attached thereto, namely, the rims and arms, and the paddles *t, t,* may be either closed, so as to assume the position shewn at fig. 8, or expanded to the position of fig. 7; or may be placed in any intermediate position. To effect this adjustment, there are two screws *u, u,* connected by wheels *v,* which cause the two screws to move simultaneously; so that by turning the wheels *v,* the screws cause the paddle-wheel to expand and contract at pleasure.

The patentee claims, Firstly,—the improved methods of increasing the velocity of the propellers or propeller, beyond that of the engine-shaft, represented by figs. 1, 2, 3, and 4, and hereinbefore described. Secondly,—the method, herein described, of preventing bands or straps from slipping on the drums or riggers. Thirdly,—the arrangement or combination of instruments, for raising and lowering, and also of attaching and detaching screw-propellers, shewn at figs. 5, and 6; and Fourthly,—the method of adjusting paddle-wheels, herein described.—[*Inrolled in the Rolls Chapel Office, November,* 1843.]

To Moses Poole, *of Lincoln's-inn, in the county of Middlesex, Gent., for improvements in the deposition of certain metals, and in apparatus connected therewith,—being a communication.*—[Sealed 25th May, 1843.]

These improvements consist in the employment of certain solutions of gold, silver, and copper, not hitherto used for the purposes of deposition, and also in the application of a thermo-electrical battery or apparatus in connection with the same, and which may be employed with other known solutions. The following is the specification as enrolled by the patentee :—

Preparation of silver solution.—" I dissolve one pound troy of silver in nitric acid, and dilute with one gallon of water : precipitate the silver by adding a solution of carbonate of soda (in water) of 100° Fahrenheit (one pound of carbonate of soda is sufficient, if the nitrate of silver contains no free acid) ; I wash the precipitate with warm distilled water, and filter. In another vessel I dissolve eight pounds of hyposulphite of soda in two and a half gallons of water, at 100° Fahrenheit, or thereabouts, and add thereto one pound of carbonate of soda, with the precipitated carbonate of silver ; stirring the same until the silver is re-dissolved, which will be the case in a few minutes, and filter the solution, which will then be fit for use.

Note.—" In practice, I have found it advisable that the solution contain free hyposulphite and carbonate of soda, and for this purpose, I add one pound avoirdupoise hyposulphite, and one third of a pound of carbonate of soda, in proportion to every pound troy of silver, that may be deposited.

Note.—" In place of hyposulphite of soda, hyposulphite of potash may be used, in the proportion of two pounds of hyposulphite of potash to one pound of silver, in the state of carbonate ; and in working the same, I add six ounces of hyposulphite of potash, and five ounces of carbonate of soda, to every one pound troy of silver deposited therefrom.

" What I claim, as this part of the invention, is the use of a solution of carbonate of silver in hyposulphite of soda or potash, as above described.

"Secondly.—Or I prepare a solution of silver, as above, and boil the same for one hour, during which time a portion of silver is precipitated, and the hyposulphite changes, forming a new and distinct salt. The solution is filtered, and is then fit for use. In both the above cases, currents of electricity are used when depositing. I also claim the solution of silver, formed by boiling hyposulphite of soda, or potash, with carbonate of silver, as above described.

Preparation of gold solution.—"I dissolve one ounce troy of fine gold in nitro-muriatic acid, and evaporate the solution until it assumes a deep red color, and chrystallizes upon cooling. I then dilute the remaining solution with one pint of distilled water, and filter. I then heat the clear solution of gold to about 200° Fahrenheit, and precipitate the gold by adding a solution liquor ammoniac. I then pour the precipitate gold upon a filter, and wash it several times with hot water. I then dissolve this precipitate of gold in one gallon of water, containing eight ounces of hyposulphite of soda, or an equivalent quantity of potash, and boil the same together for one hour. I then filter the solution, and it is fit for use; during the process of gilding, I prefer to warm it to about 100 or 150° Fahrenheit. In using the above, I employ a small anode of gold, say about one-tenth the size of the article to be gilt, and a current of two pairs of plates (if I employ the ordinary galvanic battery); but the effect may be varied by altering the power of the battery and the size of the anode, at the pleasure of the operator.

"I claim the use of a solution of gold in hyposulphite of soda, or potash, in the manner above described, and in connection with a current of electricity, for the purpose of gilding metals.

Preparation of copper solution.—"I dissolve one pound of carbonate of copper in eight pounds of hyposulphite of soda, (or an equivalent of potash,) and one pound of carbonate of soda dissolved in two and a half gallons of distilled water, at 100° Fahrenheit, or thereabouts, and filter to obtain a clear solution. It is then fit for use, with currents of electricity, and I prefer to use it at 100° Fahrenheit. I claim the solution of copper in hyposulphite of soda, or potash, as above described, with a current of electricity for the purposes of deposition.

Description of the thermo-electrical battery.—" I take one hundred pieces of German silver, containing twenty to twenty-five per cent. of nickel, and one hundred pieces of iron, every piece being one inch wide, and one foot long, and one-eighth of an inch in thickness. These two hundred pieces are soldered so to each other, that iron is always combined with German silver, (see fig. 1, Plate I.) To get a compact form, I arrange, first, ten rows, every one of twenty pieces or ten pairs, and solder these rows so to each other, that they are parallel, and the whole take the form of a square, in the manner shewn at fig. 2; taking care that the several pieces are soldered together in such a way that iron will always be in connection with German silver. When the whole is united, I place it in a rim or frame of iron-plate *g*, fig. 3, (one foot two inches high); but so that the metals do not touch each other, nor the iron rim or frame; and fill the rim with plaster of Paris or clay, but so that all soldered parts of the series of plates or bars are uncovered, that is, the under ends one inch, and the upper ends three inches. The clay is covered at the surface *a*, with a layer of pitch. The frame, containing the series of bars or plates, is so placed, that the lower ends of the series, (one inch,) dip into a sand bath *b*, which is heated nearly to redness, by the fire *c*. The upper ends (three inches) are to be kept as cold as possible, and for this purpose, I cause a current of cold water to flow from the vessel *d*, over the battery to the vessel *f*. The upper end of the metals, (three inches,) may be covered with a lac or varnish." *h*, is the anode wire leading from the German silver plate; and *i*, is the artule wire leading from the iron plate.

The patentee claims, in reference to this part of the invention, the use of a thermo-electrical battery, as above described, for the purpose of generating electrical currents, applicable to the deposition of metals; and also, the use of thermo-electricity, as a means of depositing metals from their solutions. —[*Inrolled in the Inrolment Office, November,* 1843.]

To JOHN WHITE WELCH, *of Austin Friars, merchant, for an improved reverberatory furnace, to be used in the smelting of copper ore, or other ores, which are or may be smelted in reverberatory furnaces.*—[Sealed 21st July, 1841.]

THIS improved reverberatory furnace is represented in Plate I. Fig. 1, being a horizontal plan of the lower part of the furnace, with the upper part thereof removed, in order to shew the lower part; fig. 2, a side elevation of the furnace on the side where the fire-place is situated; and fig. 3, a vertical section of the same. The furnace has two chimney flues or passages *g, g,* leading away in opposite directions from the circular bason or body *a,* of the furnace, to two upright chimney-stacks *e, e,* by means of which chimneys the requisite draft or current of air is obtained, to raise the fire which is contained in the fire-place *f,* to burn with intensity; and a rapid current of flame, heated smoke, gas, and air, proceeding from that fire, passes over a low wall *c,* called the fire-bridge, into the body *a,* of the furnace, at the upper part thereof, where the flame, which is intermixed with heated smoke, air, and gas, proceeding from the fire, strikes upwards beneath the arched dome, which forms the cover or ceiling over the body *a,* of the furnace; and the said current of flame, heated smoke, and air, is reflected or reverberated downwards, from that dome, upon any ore (or ore in that state commonly called regulus, or imperfect metal) or melted metal, which may be lying on the floor of the furnace, so as to give a strong heat to the ore (or regulus or imperfect metal) or melted metal; the current of heated smoke, gas, and air, with so much of flame as may be remaining therein, then becomes divided into two currents, which pass off at the chimneys.

The ore may be introduced into the furnace by means of hoppers, as shewn in the drawing at *i, i.*—*k, k,* are openings, near to each of the chimneys *e, e,* through which iron rabbles can be introduced, in order to stir and turn over the ore, and push it, when required, down the sloping floors of the passages *g, g,* on to the floor *a,* of the furnace, where the heat is greatest, in consequence of the proximity to the fire-place *f;* and ore or regulus may be introduced into the centre of the floor *a*, of the furnace, from a suitable hopper, placed over the top of the arched dome, which forms the ceiling to that part of the furnace. *d*, fig. 1, is the tapping-hole, for drawing off the metal from the furnace, after it has been melted, or reduced to a fluid or a semi-fluid state; *l*, and *m*, are openings into the body of the furnace, for the purpose of skimming and raking off the scoria from the surface of the metal. The opening *m*, also gives dross for stopping up the tapping-hole *d*, from the inside, when required.

The furnace is built of bricks, and lined with fire-bricks at all the parts which are exposed to the strong heat, in the usual manner of the furnaces used in copper smelting. The brick-work is strongly bound together by upright iron bars, and horizontal iron ties, passing across the furnace, from one such upright to a corresponding upright at the opposite side of the furnace, in the usual manner of reverberatory furnaces.

The three hoppers, into which the ore or regulus is put, as before mentioned, in order to let the same down into the furnace, at *i*, *i*, and at the centre *a*, of the furnace, are made of iron; and the three iron hoppers are sustained on arched frames, or bridges of iron, whereof the extreme ends rest on the side walls of the furnace, without any weight being thrown on the arched dome of the furnace, which is the usual manner of supporting such hoppers over smelting furnaces. *h*, *h*, fig. 2, are openings into the chimneys *e*, *e*, for the purpose of clearing them out; these openings are stopped up with bricks or stones, when the furnace is in use. The improved reverberatory furnace, above described, is to be used in the smelting of copper ores, or other ores which are or may be smelted in reverberatory furnaces; such, for instance, as the ores of tin, lead, zinc, or bismuth.

The patentee states his invention to consist in the construction, hereinbefore described, of the improved reverberatory furnace; the novelty and chief distinction being, that the current of flame, heated smoke, gas, and air, is divided into two separate currents, which pass away laterally from the body of the furnace in opposite directions, in order to go by two distinct flues or passages to the chimneys; and in each of which passages part of the ore, to be operated on, may be placed, so as to receive a heating action from the divided current of flame, &c., when passing to the chimneys. —[*Inrolled in the Rolls Chapel Office, January,* 1842.]

To Frederick William Eggleston, *of Derby, in the county of Derby, confectioner, for certain improvements in the combustion of fuel, and consumption of smoke.*—[Sealed 15th June, 1843.]

This invention consists in supplying air to the volatile and gaseous products of furnaces, through wire-gauze, in order to promote the combustion of the same.

A mode of applying this invention to steam-boiler furnaces is shewn in Plate II. Fig. 1, is a longitudinal section of the boiler and furnace; and fig. 2, is a transverse section, on the line A, B, of fig. 1. The furnace, in its general details, resembles those in ordinary use; the only parts that are altered being the door and the bridge. The centre part of the door is removed, so as to leave a rectangular frame; and to this a sheet of wire-gauze *a*, is attached. The upper part of the fire-bridge is hollow, and the air enters into it, either through the flues *b*, which open into the atmosphere, or through the flues *c*, opening into the ash-pit; the air leaves the fire-bridge through the wire-gauze *d*, fastened across the opening in the top of the bridge. The flues *b*, and *c*, may be used, either conjointly or separately; their lower openings should be furnished with dampers.

In conclusion, the patentee says:—"I am perfectly aware of various modes having been employed for supplying air, in small jets or films, to the gaseous or volatile products of the fuel, and from sources independent of the ash-pits of the furnaces in which the fuel is consumed. I do not, therefore, claim, as of my invention, or the exclusive use of any of the separate parts or arrangements, hereinbefore described or referred to, for supplying air in jets or films, and from such independent sources; except when the same may be employed in connection with my said invention, which I hereby declare to consist in the improvements in the combustion of fuel and consumption of smoke, to be effected by supplying the air to the volatile or gaseous parts of the fuel through one or more pieces of woven wire, or wire-gauze; the said gauze having meshes of such size, or the said meshes being so arranged, overlaying each other, as to cause the air to become mixed with the said gaseous matter in extremely small or minutely divided jets or films, as above described."—[*Inrolled in the Inrolment Office, December,* 1843.]

To THOMAS WELLS INGRAM, *of Birmingham, in the county of Warwick, engineer, for his invention of improvements in pressing and embossing wood and other materials, in order to apply the same to various useful purposes.*—[Sealed 10th June, 1843.]

THESE improvements in pressing and embossing wood and other materials, in order to apply the same to various useful purposes, consist in producing raised or embossed surfaces upon wood and other materials, (hereinafter described,) for the purpose of ornamenting faces of discs, rings, tablets, and mouldings; the surfaces of bosses, and a great variety of other forms, by means of dies or moulds; which embossed wood and other materials are to be employed as substitutes for horn, metal, papier-maché, and other substances, heretofore applied to such uses. These embossed articles are manufactured in the following way:—

In the production, for instance, of discs and rings, for the ends of reels for reeling on and holding certain quantities of thread, silk, cotton, and such like filimentous material, for buttons, medallions, draft-pieces, counters, cushion and box-tops, scutcheons, &c.; for rosettes, to be employed in ornamenting various kinds of fancy articles, and for furniture, and other things to which the same may be applicable. The patentee takes circular or other shaped discs of wood, turned or cut to the required size, thickness, and form, either flat, curved, or bevilled, on their face and back, as may be desired.

These discs or rings are placed severally between dies and counter-dies, engraved with the required devices, of the construction usually employed by horn button-makers; and being subjected to pressure, the reverse of the figures and device of the dies is produced upon the discs or rings of wood, which, when so made, are called by the patentee *stenoxyle* discs, rings, buttons, rosettes, &c. In embossing tablets for inscriptions; for finger-plates to be attached to doors; for fancy boxes, cigar-cases, spectacle-cases, ladies' work-cases, and similar sorts of articles; for the backs of brushes; for book-covers; and a great variety of other uses, tablets of wood are prepared, of the required size and shape, by cutting and planing; and they are then pressed between dies, in the manner before described, which, when so operated upon, produce *stenoxyle* tablets, applicable to the purposes above mentioned.

In producing *stenoxyle* mouldings, the wood is first prepared, by cutting and planing it in lengths to the necessary dimensions and figure, and, at several operations, compressing these lengths between suitably formed dies, in the manner above described; such dies being engraved or cut with the desired ornamental devices. After an impression has been given to a portion of the length of the moulding, the pressure is withdrawn from the dies, and the length of the moulding passed onward to receive a similar impression in another part of its length; and by these means several dies may be brought into operation upon the length of moulding, so as to produce a variety of figures or devices thereon. These *stenoxyle* mouldings may be applied to the purposes of forming picture frames, cornices, beadings, and to various other ornamental uses. The same operation of embossing between dies may be performed upon a variety of wooden articles, as umbrella, parasol, and other wooden handles; the means of effecting which, by dies, is so well understood, in reference to embossing horn and metal, that it is unnecessary further to explain the operation.

In some cases, where the pattern or device extends to any considerable length, the wood may be compressed, by means of embossing-rollers, instead of the dies above mentioned.

The other materials, besides wood, which are proposed to be operated upon by pressure, in order to produce embossed surfaces, are, first, a composition of granulated wood, with or without other materials; the particles of which granulated wood are made to adhere firmly together, and to produce a hard substance, by means of pressure alone. For this purpose the patentee takes the saw-dust of any ordinary wood, (that from oak, maple, or beech, will answer very well,) and reduces it to as fine a dust as convenient. To this is sometimes added calcined sulphate of iron, in a dry pulverised state, with the granulated wood, in the proportion of from one-half to one-fourth of the calcined sulphate of iron to the bulk of the granulated wood. This composition is particularly applicable to making rings, discs, tablets, buttons, medallions, rosettes, and all the finer descriptions of articles.

Dry pulverised pitch, or other bituminous matter, may be mixed with the granulated wood, in the proportions of about one-fifth of the bitumen to four-fifths of saw-dust in bulk; but other proportions would do, observing that the finer the subject to be produced by the embossing process, the less of the bitumen should be employed. This composition would also answer for picture-frames, cornices, mouldings, coffin furniture, and a variety of other articles.

In order to apply these compounds, a suitable mould is provided, having its interior engraved with the required device. The mould is filled with the pulverised materials, and submitted to great pressure, which will cause the pulverised materials to adhere firmly together; and when discharged from the mould the article will have assumed a hard, solid, and firm consistency, in the form and with the device accurately embossed upon its surface. The patentee also combines with the embossed wood, or ligneous composition, cloth, silk, leather, or other suitable material. This is done by first embossing the surface of the wood or ligneous composition, and then covering the surface thereof with the material, having introduced between them an adhesive matter, to render the attachment secure. The article must then be placed in dies, and pressed a second time, which will give to the external surface the embossed face or device required. This may, in some cases, be done by one operation, but will generally require two to prevent the outer covering of silk, &c., being injured. This last described combination will apply to book-covers, reels, buttons, and to other articles, which need not be enumerated.

The patentee claims producing raised or embossed surfaces upon wood or ligneous compositions, either alone or in combination with other materials, by means of dies, moulds, plates, or rollers, as above described, for the purpose of ornamenting the faces of discs, rings, tablets, and mouldings; the surfaces of bosses, and a great variety of other forms.—[*Inrolled in the Inrolment Office, December,* 1843.]

Specification drawn by Messrs. Newton and Son.

To HAYWARD TYLER, *of Milton-street, Fore-street, Cripplegate, in the city of London, brass-founder, for certain improvements in machinery or apparatus for impregnating liquids with gas; including bottles for retaining, keeping, and preserving liquids so impregnated; also in the manner of filling and closing such bottles.*—[Sealed 7th March, 1840.]

THIS invention consists, chiefly, in an arrangement of machinery for impregnating liquids with gas, and more particularly for producing what are termed aerated liquids.

The machine contains two forcing-pumps, one for soda-water, and the other for lemonade, communicating by pipes, with two hemispherical receivers, (fastened together by bolts and nuts, but separated by a partition,) wherein the gas is thoroughly intermixed with the liquid, by revolving agitators. From the receivers the aerated liquids are drawn off and bottled.

A vertical section of the soda-water pump is represented in Plate II., at fig. 1; it consists of a barrel *a*, in which a long piston *b*, works; at the upper end of the barrel a valve-chamber is formed, containing a conical valve *c*, and connected by the pipe *d*, with the receiver above mentioned; and mid-way between the ends of the barrel are two other valve-chambers, situated diametrically opposite each other. These chambers contain the conical valves *e, f,* by which the gas and liquid are admitted into the barrel from the suction-pipes *g, h,*; the valves *c, e, f,* being guided in their movements by four leaves *i,* attached to the upper part of each valve, and working in contact with the cylindrical interiors of the valve-chambers. By the descent of the piston, a vacuum is formed in the upper part of the pump-barrel, into which the gas and liquid are admitted through the valves *e, f,* and by the return-stroke of the piston they are forced through the valve *c,* into the pipe *d,* leading to the receiver.

Fig. 2, is a vertical section of the lemonade-pump; *a,* is the pump-barrel, and *b,* a leather piston, connected, in the manner shewn in the drawing, to a large cylindrical rod *c.* At the upper part of the barrel are two valve-chambers *d, e,* with their valves *f, g,* and branch-pipes *h, i*; and at the lower part of it are two other valve-chambers *j, k,* with their valves *l, m,* and branch-pipes *n, o.* The liquid is drawn into the upper part of the barrel, through the pipe *h,* and valve-chamber *d,* by the descent of the piston, and, by its ascent, is forced through the chamber *e,* and pipe *i,* into a pipe connected with the receiver. The gas is drawn into the lower part of the barrel, through the chamber *j,* and pipe *n,* by the ascent of the piston, and is forced, by the descent of the same, through the chamber *k,* and pipe *o,* into another pipe, connected with the receiver. The gas, and the liquid to be impregnated with gas, are thus alternately forced into the receiver at each stroke of the pump, and are then acted upon by the revolving agitator before mentioned. Instead of this double-action force-pump, two single-action force-pumps, worked by one lever, may be used; a small pump being used for the liquid, and a larger one for forcing the gas into the receiver.

The receivers, used in the manufacture of aerated liquids, are generally made of metal, tinned on the inside; but, to prevent the liquids from becoming tainted or discolored, by remaining therein, the patentee employs an inner vessel of glass, pottery, or "clean metal," for containing them.

With regard to the bottles for containing aerated liquids, the improvement in them consists in the formation of an additional neck, at the large end of the bottle, as shewn in the section, fig. 3; *a*, being the ordinary neck, and *b*, the small additional one. The bottles are filled through the small neck, and emptied by means of the larger neck.

The patentee claims, Firstly,—the application of two distinct suction-valves to the force-pump, by which gas and liquid are to be forced together into a receiver, for the purpose of impregnating such liquid with the gas; one of these suction-valves being for the gas, and the other for the liquid. Secondly,—the double-action force-pump, represented in fig. 2, by which gas and liquid are to be forced separately into a receiver, for the purpose of impregnating such liquid with the gas, but without allowing that liquid to mix with the gas, until the gas has become compressed. Thirdly,—the application of two distinct single-action force-pumps, for the same purpose as the double-action force-pump, just mentioned; one of these pumps being for gas, and the other for liquid. Fourthly,—the application of an inner vessel to the receiver, to contain the liquid that is to be impregnated with gas. Fifthly,—the formation of bottles for retaining, keeping, and preserving liquids impregnated with gas, with a small additional neck, and filling the bottles at that neck, and closing the same with a smaller cork than usual, to avoid the loss of the gas.—[*Inrolled in the Inrolment Office, September*, 1840.]

To JOHN GILLETT, *of Brailes, in the county of Warwick, farmer, for an improved machine or apparatus for cutting or boring ricks.*—[Sealed 25th May, 1843.]

THE improved machine or apparatus, shewn in Plate II., is intended for boring or cutting holes in ricks, for the purpose of ascertaining the quality or state of the produce of which the rick is composed; and if a rick is found to be in a heated state, or in a state of incipient spontaneous combustion, (as is often the case, when agricultural produce is prematurely stacked,) one or more clean circular holes may be bored or cut, by means of this machine or instrument, whereby the interior of the rick will be ventilated, and any vapour that may be generated therein, will be allowed to escape, and the contents of the rick, or a greater portion thereof, will be thereby saved from destruction. This object is now generally effected by pulling the rick to pieces, or cutting a great portion of it away, and exposing its contents to the air; but, owing to the trouble and expense of this operation, it is often neglected, and, consequently, if the rick does not ultimately spontaneously ignite, the greater portion is frequently so damaged as to be utterly valueless.

The apparatus for effecting the above-mentioned improvement consists of an annular or circular cutter, formed on the end of a cylinder, and attached to the lower end of a forked piece, open at the sides; together with a screwed rod, which is fastened in a socket, at the upper end of the fork, for the purpose of steadying the cutter, when in operation.

Fig. 1, represents a front view of the improved apparatus complete, and ready for use; and fig. 2, is a sectional view, taken at right angles to the preceding figure. *a, a,* is the forked piece, constituting the sides of the apparatus; and at the lower end thereof, the circular or annular cutter *b, b,* is formed. The edge of this cutter is made of a peculiar form; it has two points at opposite sides, and the whole, or the greater portion of the edge is inclined to the horizon, for the purpose of acting more favorably upon the produce, and cutting it with greater facility. The cutting edge is steadied and kept in contact with the hay or other produce, by means of a centre rod *c, c,* which is pointed at its lower end, and has a screw formed thereon, as is seen in the drawing. This rod, which is shewn detached at fig. 3, answers the same purpose as the screw and point at the end of a gimlet or auger; and its upper end is passed through a hole, formed at the upper part of the forked piece *a, a,* and is firmly held therein, by means of a cottar *d,* which also retains the centre rod in a socket, formed at the lower end of the handle-shaft *e, e,* and thereby binds the various parts together. Previous to inserting the point of the centre rod into the rick, a flat board or plate *f, f,* is firmly secured thereon, as seen in figs. 1, and 2, by means of two or more instruments, similar to that shewn at fig. 4. These instruments have screws formed on their ends; and when passed through holes made in the board *f, f,* for that purpose, and screwed into the rick, as seen in the drawing, the board is firmly held thereon, and made to compress or consolidate the hay or other substance. This board may, however, be used without these instruments, if required, provided it is made sufficiently large to allow the person, who uses the boring or cutting machine, to stand thereon, as his weight will produce the same effect, viz., consolidating or compressing the surface, as the screws or rods shewn in the drawing; although, perhaps, it will not be always found so convenient.

A circular hole *g,* of a diameter rather exceeding that of the cutter, is made in the board, for the purpose of guiding the instrument, and allowing it to work freely. The board *f,* being firmly secured, and the hay sufficiently compressed to be operated upon, the point of the rod *c,* is inserted, and forced into the hay, or other material, as near the centre of the hole as possible; and on turning the handle *h,* above the screw, on the rod *c,* brings the cutter in contact with the hay or other material, and cuts out a circular piece. Upon continuing to turn the handle, the screw will gradually advance farther and farther into the rick; the cutter *b,* following and cutting its way, until the space between the side-pieces *a, a,* is filled, when the borer must be drawn out, and the hay or other material removed, so as to cut out a fresh quantity. When the borer has thus made as deep a hole as its length, and the length of the handle-rod *e,* will allow, an additional rod *i,* is attached to the end of the rod *e,* by inserting the upper end of the latter into a socket, made in the lower end of the rod *i,* and retaining it therein, by means of a cottar *d,* as in the former instance. A cross-handle *h, h,* is applied to the upper end of the handle-rods, for the convenience of turning, and may be removed therefrom and applied to the additional rods, as they are required to be added. By attaching these rods, as the borer cuts away the hay, or other material, a clean hole, of any depth, may be made in a rick, in a very short space of time.

The patentee claims, Firstly,—the peculiar construction and arrangement of parts, constituting an apparatus or machine for boring ricks or stacks, or any quantity of agricultural produce collected together, as herein shewn and described. Secondly,—the employment of a circular, annular, or cylindrical cutter, whereby a clean circular hole may be made; and Lastly,—the employment of a board or plate, as seen at *f*, *f*, in the drawing, with its screws, rods, or other fastenings, for the purpose of compressing and consolidating the upper surface of the hay or other agricultural produce, so as to facilitate and assist the operation of the machine or apparatus, as above described.—[*Inrolled in the Petty Bag Office, November*, 1843.]

Specification drawn by Messrs. Newton and Son.

To Oglethorpe Wakelin Barratt, *of Birmingham, in the county of Warwick, experimental chemist, for certain improvements in gilding, plating, and coating various metallic surfaces.*—[Sealed 15th June, 1843.]

The first part of this invention relates to the arrangement of a voltaic apparatus, with which the deposition of metals is effected. The patentee describes his improvements in nearly the following words:—I use lead, as the positive metal, and carbon, in preferenee, for the negative element. I place them in a convenient vessel, and connect them in pairs, or in series, in the usual way, which is well understood, and charge the battery with the following solution:—The exciting liquor is produced by dissolving one part of chloride of sodium in three parts of water; but I do not confine myself to these exact proportions; and a plate of metal, as the supply metal, is suspended in the metallic solution to the wire connected with the carbon or other negative element of the battery, and the articles to be coated or covered are to be suspended in the metallic solutions, by the wire which is connected with the lead or positive metal of the battery. On the circuit being closed, a decomposition of the muriate of soda in the battery takes place, and a regular continued electric action is produced, as long as any chloride of sodium remains in the solution. The products of the battery are chloride of lead and caustic soda, mixed with carbonate of soda, the value of which products is considerably greater than the expense incurred in the deposition of the metal. The particular feature which I claim, under this head, is arranging or producing a battery, whereby a valuable product or products may be obtained from working the battery, for the deposition or precipitation of metals, which product or products will more than counterbalance or cover the ordinary cost or expense attendant upon the operation.

Another battery, which I employ for the deposition or precipitation of metals, is formed with zinc, carbon, and water. In the formation of this battery, I have found that the crucibles which are made of carburet of iron or plumbago are very convenient, and answer the purpose extremely well; although I do not intend to confine myself exclusively to the use of vessels made of this material, as other combinations of carbon or metals will effect the object, but not in so convenient a manner. In making use of vessels formed of carburet of iron, fifty of number ten size, in series, with zinc, and charged with water, will be found sufficiently powerful for gilding and silvering very large articles. To form a battery with the crucibles above mentioned, holes should be pierced in their sides, or they should be made open at the bottom, and the zinc made a little smaller than the inside of the vessel or crucible formed of carburet of iron, or other combinations of carbon; and the zinc should be separated from the carbon, or other negative element, by employing paper, cloth, or other similar substance. It may be here observed, that the object to be attained, by the employment of paper, or other substance, to enclose the zinc, is to prevent the surfaces of zinc and carbon from coming into contact; but care must be taken, when paper is used, that it is free from size or gelatine, as the free passage of the electricity would be otherwise impeded. The same object may be effected by suspending the zinc in the vessel in such a manner that the zinc shall not come into contact with the carbon or negative element. The connecting wires are attached in the usual way,—each pair (namely, one of carbon and one of zinc), is placed in a vessel containing water. I claim the above-described battery for dissolving, precipitating, or depositing metals.

The next improvement relates to obtaining electricity continuously from the magnet, and which is collected or concentrated, so as to be employed for the deposition of metals. This apparatus I denominate an electrical magnetic battery, or battery of magnets; and to form which, any number of magnets must be taken and fixed firmly in wood, at equal distances in an upright position, if horse-shoe magnets are used; and, by means of iron wire, the south pole of the first magnet should be connected with the north pole of the second, and the south pole of the second to the north pole of the third, and so on to any number that it may be necessary to use. To the north pole of the first magnet I attach a copper wire, to suspend the work to be coated in the decomposition-vessel, and to conduct the electricity from the metallic solution back to the magnet; and to the south pole of the last magnet I attach an iron wire, from which a plate of metal, of the same description as the metal held in the metallic solution, is suspended. The wire, in connection with the north poles, is placed at the ends or near the points of the poles; but the wire, in connection with the south poles, is placed from half an inch to an inch from the ends, according to the power of the magnet, or the nature of the work to be coated. Sometimes a single magnet may be employed for small work, or a compound magnet may be used, and placed in a horizontal position; but it is not so convenient, or easy of management as a number of magnets, arranged in a series, as above described.

The patentee claims, in reference to this part of his improvements, the employment of a single or compound magnet, or a series, formed of horse-shoe or bar magnets, and unconnected with any motion, as has heretofore been proposed.

The next part of this invention relates to the dissolving of [illegible]. Take equal parts of nitrate of potash, chloride of sodium, and sulphate of alumina and potash, and dissolve them in water, in a convenient vessel; then immerse the silver, or other metal to be dissolved, in the solution, and connect it with the negative metal of a battery; and to a wire, connected with the positive metal of the battery, suspend, in the solution, a plate of metal, of the same description as the metal to be dissolved; when the solution is nearly saturated with the dissolved metal, it will begin to be deposited on the other plate, but the action should be continued until the deposited metal appears of a good color, and in a firm and coherent state on the other plate. The solution is then in a fit state to be used for coating or covering other metals, and the plate of metal may be removed, and the articles to be coated placed in the solution. Other solutions of the metals may also be used, such as metallic silver, dissolved in a solution of chloride of sodium, or hyposulphite of soda, or cyanide of potassium. Another solution for dissolving gold, platinum, lead, silver, palladium, and other metals, is prepared in the following manner:—Take four parts of chloride of sodium and one part of boracic acid, and dissolve them in twenty parts of water. As another solvent of the metals, twenty parts of chloride of sodium and seven parts of tartaric acid, dissolved in from eighty to one hundred parts of water, may be employed.

The patentee claims, with respect to this part of his invention, dissolving and preparing solutions of the metals, as above described.—[*Inrolled in the Petty Bag Office, December*, 1843.]

Specification drawn by Messrs. Newton and Son.

To WILLIAM BETTS, *of Ashford, in the county of Kent, railroad contractor, and* WILLIAM TAYLOR, *of the same place, plumber, for their invention of improvements in the manufacture of bricks and tiles.*—[Sealed 8th March, 1843.]

THE object of this invention is to produce bricks, tiles, and other similar articles from clay, in a much drier and harder state than that in which it is generally employed for these purposes. The great advantages resulting from this will be evident to every person conversant with brick-making; as, by the employment of clay, in a drier and harder state than usual, the bricks or tiles will be ready for the kiln much sooner than when clay, in the ordinary or wet state, is used; and, furthermore, any machine that can make bricks or tiles from clay, in a partially dry state, may be worked through the whole, or, at any rate, the greater portion of the winter; whereas, when clay, in a wet state, is employed, the operation of brick-making must be entirely suspended for many weeks in the winter, as, during this damp and cold season of the year, the bricks or tiles would not become sufficiently dry and hard to be removed to the kiln.

Before introducing the clay into the improved machine, it is necessary first to temper it, and then, with a conveniently-shaped tool or instrument, rough bricks or lumps of clay, in size about nine inches long and four inches broad, are cut out and placed on small boards or pallets, and then introduced into the machine, where they are submitted to pressure, and made into the required form.

The machine, in which the bricks are pressed or formed, is shewn in Plate III.; fig. 1, being a front elevation; fig. 2, a side view; fig. 3, a transverse vertical section, taken in the line A, B, of fig. 1; and fig. 4, a horizontal section, taken immediately above the mould and plunger. The frame-work of the machine is shewn at *a*, *a*, and the driving-shaft, by means of which the various parts are actuated, at *b*; the mould *c*, is suspended by the rods *d*, *d*, to the longer arms of two vibrating levers *e*, *e*. The plunger *f*, whereby pressure is applied to the clay in the mould, is connected to the end of the rod *g*, the upper end of which is attached to a ring, which surrounds an excentric *h*. A pinion *i*, on the shaft *b*, gears into and communicates motion to the toothed-wheel *j*, on the spindle *k*, which is also the axis of an oval or elliptical toothed-wheel *l*; on the side of this wheel *l*, is cast an excentric *m*, which, by means of a connecting-rod *n*, communicates a rocking motion to the shaft *o*, below. A toothed sector *p*, is keyed on to this shaft *o*, and rocks or vibrates with it; and by gearing into the rack *q*, on the under side of a moveable frame *r*, a reciprocating motion is communicated to the latter, for the purpose of bringing the rough bricks or lumps of clay on to the platform, and under the mould and plunger; at the same time sliding the brick, that has just been operated upon, out of the machine.

The rough brick or lump of clay having, by the reciprocating motion of the moveable frame *r*, been brought into the machine, the mould *c*, is brought down in the following manner :—The oval or elliptical toothed-wheel *l*, gears into a similar wheel *l**, immediately above it, and which is mounted on the same axis as the excentric *h*, which actuates the plunger *f*. At the opposite end of this shaft is mounted a toothed-wheel *s*, which gears into another toothed-wheel *t*, on the shaft *u*. Two small cams or excentrics *v*, *v*, seen best in fig. 3, are mounted on the shaft *u*, and bear against shorter arms of the levers *e*, *e*; and as these cams revolve, they depress the shorter arms, and thereby raise the longer arms of the levers *e*, *e*. By this means the mould *c*, is raised, and immediately that the shorter arms of the levers *e*, *e*, escape from contact with the cams *v*, *v*, the mould *c*, descends, and surrounds the rough brick or lump of clay which is placed on the platform below. The edges of the mould being bevilled, it will cut or shave off any portion of clay that may project beyond it. The mould and clay being in this position, the plunger *f*, is brought down on to the former, by means of the excentric *h*, before mentioned; and in order that the plunger may move with steadiness, and always keep in a perfectly level and horizontal position, it is connected to a sliding-frame *g**, *g**, which, by sliding up and down in grooves, in the frame-work, acts as a guide to keep it level and true.

It has been stated, that motion is communicated to the various parts, which actuate the mould and plunger, through the intervention of the two elliptical or oval wheels *l*, and *l**. Toothed-wheels, of this peculiar form, are employed for the purpose of obtaining greater power at the particular moment when the pressure is applied; and also for gaining speed to quickly remove the plunger, when it has performed its office.

At the time when pressure is being applied, that is, at the moment when all the parts are in the position represented in fig. 3, the shortest radius of the wheel *l*, is gearing into the longest radius of the wheel *l**; consequently, the former has a great amount of leverage; and, immediately it passes this point, the length of its radius so rapidly increases, that it accelerates the speed of the wheel *l**, and thereby that of the plunger in its upward motion.

Two small circular holes, *f**, *f**, fig. 4, are made in the top of the plunger, for the purpose of allowing the escape of the superfluous clay from the mould; which, when pressure is applied, jumps out on to a board, placed in front, as in fig. 3.

The various motive parts of the machine are so arranged, that, immediately upon the plunger exerting its pressure on the clay, the small excentrics or cams *v*, *v*, come into contact with the shorter arms of the levers *e*, *e*, and raise the mould *c*, suddenly; the plunger all the while remaining in nearly an inactive state, on the top of the brick which has been pressed into the required form.

The brick having been, by this means, discharged from the mould, it is now necessary to raise the plunger therefrom; and in order to prevent the brick from sticking to the plunger, a little apparatus is attached thereto, intended to effect this object. Upon referring to the plan view, fig. 4, and the detached sectional view, fig. 5, of this part of the apparatus, it will be seen that a small quadrangular hole is made in the centre of the plunger, and in this hole an additional plunger *w*, is accurately fitted. This plunger is affixed to the end of a short pin, which is jointed to one end of a small elbow lever, *x*, seen best in fig. 3, and in the detached view, fig. 5. The elbow lever *x*, turns on a stud below, and carries, at its upper end, a small anti-friction roller, as seen in the drawing; and while the mould *c*, is rising from the brick, into the position shewn in fig. 5, the plunger has not moved more than a quarter of an inch, as will be seen from the position of the excentric *h*, in fig. 3; but, as the mould *c*, rises, a small inclined piece *c**, fixed to one of its sides, comes in contact with the anti-friction roller at the upper end of the elbow lever *x*, and presses it back, thereby forcing out the additional plunger *w*, into the position shewn in fig. 5. By this means, if the brick should happen to adhere to the bottom of the plunger, it is forced off, and is carried out of the machine by the advance of a second lump of clay, to be operated upon. The pallet, containing the rough lump of clay, is placed on the sliding rack-frame, as seen in fig. 2; and this rack-frame is furnished, on its upper side, with two flat springs *y*, *y*, figs. 2, 3, and 4, which, when the clay is carried on to the platform, and under the mould and plunger, push forward, out of the machine, the pallet, carrying the newly-formed brick, as seen in fig. 3. The springs *y*, *y*, on which the pallet, carrying the rough brick, is placed, slide in grooves in the platform, and when the plunger *f*, comes down, and presses the clay, these springs recede into the said grooves. The pressure having been given, the moveable rack-frame is carried back by the sector into its original position, ready to receive a fresh lump. The platform, on which the clay receives its pressure, is grooved, for the purpose of receiving any extraneous matters that may accidently get underneath the pallet, and which would otherwise cause the brick to be made of an irregular form. As it is necessary to lubricate or "slob" the mould between every operation, in order to make it deliver easily, a reservoir, containing water, is placed at the top of the machine, and, by means of pipes, the water is allowed to drip on to two wipers *z*, *z*, which are covered with cloth, felt, or other suitable substance; and as the inside of the mould, in rising, comes into contact with the cloth or felt on the wipers, it causes the water to exude therefrom, and perfectly slob or lubricate the sides of the mould.

Although in the foregoing description, the improved machine, for the sake of simplicity, is shewn as applied to making one brick only at a time, it is evident that two or more bricks may be formed at the same operation, by merely increasing the width of the machine, as exactly the same motions that are required to make one brick, will, without any further alteration, except the addition of more moulds and plungers, make two or more bricks; and when flat or round tiles are required, the moulds and plungers must be made to correspond with the peculiar size and shape required.

The patentees do not confine themselves to the precise arrangement of parts herein set forth and described, as it may, perhaps, be varied, without departing from the nature of the invention; nor do they claim any of the parts separately, which may have been heretofore used in brick-making machinery; but they claim, as their invention, the general arrangement of machinery or apparatus for making bricks, tiles, and other articles, from clay or earthy materials, as above described and exhibited in the drawing, subject; however, to such modifications in its parts, as may be necessary, to suit different forms and dimensions of bricks, tiles, and other articles, as well as the number of such articles to be made at one operation, as above mentioned.—[*Inrolled in the Petty Bag Office, September,* 1843.]

Specification drawn by Messrs. Newton and Son.

To JOHN JOSEPH MECHI, *of Leadenhall-street, in the city of London, cutler, for improvements in apparatus to be applied to lamps, in order to carry off heat and the products of combustion.*—[Sealed 10th November, 1840.]

THIS invention consists in carrying off the products of combustion from lamps, by means of ascending tubes, which are made sufficiently large to offer a sectional area of eighteen superficial inches for each burner, capable of consuming from ten to fifteen cubic feet of gas per hour, and so on, in proportion for larger or smaller burners; and, with regard to lamps for burning oil, they are furnished with tubes of the same size as those used with gas-burners of like diameters. The lamps are suspended, by preference, near the ceiling; but, where a descending tube is not objectionable, they may be suspended much lower. The tubes should ascend to a height of thirty feet or more above the point of combustion, in order to obtain a considerable draft; their upper ends open into the atmosphere, and may be surmounted by a cowl, if required.

The patentee states, that he is aware inverted bell-shaped vessels, termed smoke-consumers, have been sometimes employed; but the small tubes, by which they were suspended, have not been more than one inch in diameter.

In Plate III., two gas lamps are represented with the above-mentioned improvements applied thereto. Fig. 1, represents a lamp with four burners, which is to be suspended near the ceiling of the apartment; the light is thrown down by the reflector *a*, and the products of combustion are carried away by the tube *b*. Fig. 2, shews a lamp with a single burner, suitable for a bracket-lamp; it has an upright reflector *a*, and a tube *b*, ascending through the ceiling.

The patentee does not claim the application of tubes, or such like apparatus, to lamps, for carrying off the products of combustion, in any case where the sectional area of the continuation upwards of the apparatus *b*, from the lamp, towards the outer atmosphere, and beyond the inverted bell-shaped vessel, (if used,) is not greater than that of the glass chimney or chimneys of the lamp or lamps; but he claims the mode of applying apparatus to lamps, in order to carry off heat and the products of combustion, as above described.—[*Inrolled in the Inrolment Office, January*, 1841.]

To JOHN JEREMIAH RUBERY, *of Birmingham, in the county of Warwick, umbrella and parasol manufacturer, for improvements in the manufacture of a certain part of umbrella and parasol furniture.*—[Sealed 13th January, 1842.]

THE part of an umbrella or parasol, to which this invention relates, is what is commonly called the wheel or top-notch, which receives the ends of the ribs; this has hitherto been produced by casting, and the groove and notches formed in it by hand; instead of which, the patentee manufactures it out of sheet metal, by means of dies.

The improved mode of manufacturing this article is as follows:—Two small discs of metal are pressed, by dies, into the shapes represented in Plate II., at figs. 1, and 2, respectively, and the lower part or centre of each is punched out, as shewn; then, by means of dies, the requisite notches are formed in the projecting edges of the pieces *a*, and *b*, and the tubular part of the piece *b*, is forced into the tubular part of the piece *a*; these parts being then subjected to further pressure, in suitable dies, the finished wheel or top-notch is produced, as seen in section at fig. 3, and in elevation and plan at figs. 4.

The patentee claims the mode of manufacturing that part of an umbrella or parasol furniture called a top-notch or wheel, by forming the same out of sheet metal, by suitable dies, as above described.—[*Inrolled in the Inrolment Office, July*, 1842.]

To WILLIAM RANWELL, *of Bowling Green Row, Woolwich, in the county of Kent, artist, for his invention of improvements in machinery or apparatus for registering or indicating the number of persons which enter any description of carriage, house, room, chamber, or place; and also the number of passengers and carriages that pass along a bridge, road, or way.*—[Sealed 13th April, 1843.]

THIS invention consists of a novel construction of apparatus, to be applied to the entrances of carriages, conveyances, rooms, and other places, whereby the number of persons entering may be registered and correctly ascertained; and also the number of passengers and carriages that pass along a road or way.

In Plate III., one of these improved apparatus is shewn as applied to a common street omnibus; fig. 1, being a vertical section, taken through the middle of the apparatus and dial-plate; fig. 2, a back view of the same; and fig. 3, a front view of the dial-plate or indicator, which, when the apparatus is in use, is covered over with a shield, secured in such a manner that it cannot be removed by the conductor.

The essential feature of this invention is, the employment of a lever or levers, which are or may be connected to the other parts of the apparatus, in such a manner, that, by acting upon one end of this lever or levers, motion is, by means of the opposite end of the lever or levers, communicated to the registering part of the apparatus.

The ordinary steps and riser of an omnibus are seen at *a, a,* and the flooring or bottom of the carriage at *b.* Two additional steps or treads *c, d,* are placed on the top of the ordinary steps *a, a,* for the passengers to tread upon. These steps *c, d,* are connected to, or act upon, a lever, or pair of levers *e, e;* the step *c,* being connected, by means of an upright rod or rods *f,* to the shorter arm of the lever or levers *e,* and the step *d,* to the longer arm thereof, by means of the long upright rod or rods *g.* The lever or levers *e,* are connected together by the tie-rods *z, z,* and are supported in bearings, and have their fulcrum at *h;* consequently, as the step *c,* and by it the shorter arm of the lever or levers *e,* is depressed, it will raise the longer arm of the lever or levers, and with it the rods *g,* and step *d.* On one side of one of the upright rods *g,* is fastened, by bolts or otherwise, a bent arm *i,* the extremity of which acts upon the shorter arm of a small vibrating lever *j,* which has its fulcrum at *k,* fig. 2; the opposite end of the lever *j,* is jointed to an upright rod *l,* which has a small ratchet-rack formed on one part of its side, as seen at fig. 2; the teeth of this rack take into the teeth of a small wheel *m,* which carries a small pinion, gearing into another wheel *n;* and by this means rotary motion is communicated to the other two toothed wheels *o,* and *p,* which carry indices on their front sides, as seen at fig. 3.

The way in which the apparatus acts is as follows:—Upon a person placing his foot upon the step *c,* which is fastened to the upright arm or arms *f,* by screws or pins *q,* the shorter arm of the lever or levers *e,* is depressed, and the longer arm and the upright rod or rods *g,* are consequently raised. This, by means of the bent arm *i,* raises the shorter end of the lever *j,* into the position shewn by dotted lines in fig. 2. The longer arm of the lever *j,* thereby becomes depressed, and draws down with it the rod *l;* and by means of the teeth on this rod, the ratchet-wheel *m,* is pulled round, and motion communicated to the wheels of the registering apparatus. Immediately that the weight of the person is removed from the step *c,* it again rises, and all the other parts assume their original position. In order, however, to guard against the possibility of the conductor preventing the apparatus returning into its original state, which will be the case if the step *c*, is prevented from rising, when the weight of the person is removed, another step *d*, is employed, and is connected to the longer arm of the lever or levers *e*. As the passenger passes from the step *c*, into the carriage, he must of necessity place one foot upon the step *d*; and owing to this arm of the lever or levers *e*, being so much longer than the other, the weight of a boy on the step *d*, will be more than sufficient to counterbalance that of two men on the step *c*.

To prevent the admission of any extraneous substance under either of the steps *c*, or *d*, which might be placed there to stop the action of the register, each step is surrounded with a metal shield *r*, *r*, accurately fitted thereto, and its edges are bevilled off, so as to prevent its catching on a stone, or other stop. This part of the apparatus may be further protected, by surrounding the joint with a leather, or other flexible band, fastened to both the fixed and moveable steps *c*, *d*, and *a*, *d*, in order to prevent dust or sand from getting in. The whole of the apparatus is covered in by a box or casing *s*, *s*. Furthermore, the door of the vehicle, seen at *t*, in the sectional view, shuts over the step *d*, and prevents it from rising, except when the said door is opened for some person to enter or leave the carriage. Consequently, correctness of registry is further insured, by the prevention of excess, which might otherwise take place from intention or accident.

Having now explained and described one method of carrying out this invention, as shewn in the drawings, the patentee observes,—it must be evident that an apparatus of this description admits of a great variety of modifications, according to circumstances, and the will of the manufacturer. For instance, instead of fastening the steps *c*, and *d*, to the upper ends of the upright rods *f*, and *g*, as shewn in the drawings, these steps may be hinged on to the ordinary step *a*, *a*, and allowed to rest only on the rods *f*, and *g*. The levers *e*, *e*, may also be arranged in a different way, or even dispensed with, as seen in their present form; and, in place thereof, a pulley or pulleys, of differential radii, may be used, still, however, adhering to the lever, or counterbalance principle. The way in which a pulley may be applied, is represented at fig. 4. The pulley *u*, turning upon an axis at *v*, is placed inside or outside the carriage, and contiguous to the roof; and a cord or chain *w*, and *x*, is fastened to the top part of the pulley, as at *y*; one end of this cord or chain being connected to the step *c*, and the other to the step *d*. The other part of the arrangement is similar to that already described, and the registration depends, as in the former instance, upon the alternate depression of the two steps; the longer radius of the pulley *u*, representing the longer arm of the lever *e*, and the shorter radius of the pulley the shorter arm of the said lever. The part *x*, of the cord or chain is connected to the shorter arm of the small lever *j*, and, by that means, transmits the requisite motions to the wheel-work, which is arranged in exactly the same manner as shewn in the other figures. It may be observed, that a small weight should be attached to the longer arm of the lever *j*, in order to insure its return to its original position. Another method of dispensing with the use of the lever or levers *e*, *e*, is shewn at fig. 5. In this figure, one or two bent tubes, supplied with a number of small balls, are used in place of the levers *e*, *e*. The additional steps *c*, and *d*, are hinged on to the fixed steps, and they are furnished at their under sides with small plungers *z*, *z*, which are inserted into the ends of the bent tubes. The plunger of the step *c*, is placed nearer the front of that step than the plunger of the step *d*; consequently, the leverage of the latter is greater than the former, and will thereby prevent the possibility of arresting the action of the apparatus. The plunger of the step *d*, is elongated, and its lower end is connected to the shorter arm of the lever *j*. The indicating part of the apparatus is actuated by the balls in the bent tubes raising and depressing the shorter arm of the lever *j*, the other end of which is connected to the upright rod *l*, as in the former instance.

In order to prevent useless repetition, the improved registering apparatus has been shewn only as applied to an omnibus; but, with the exception of both steps being on the same plane, the apparatus may be applied, in nearly the same form, to the entrances of rooms or places, in order to ascertain the number of persons entering the same; or to bridges, roads, or ways, to indicate the number of persons or vehicles passing over or along such ways,—the principle of the invention being a counterpoise, in order to prevent any tampering with the apparatus.

The patentee claims any arrangement of mechanism, in which, by acting on one end of a lever or levers, the other end may be made to move or actuate any registering apparatus; or, as shewn in fig. 4, by acting on or depressing one side of a pulley or pullies, of differential radii, the opposite side may be raised and made to effect the same object.—[*Inrolled in the Petty Bag Office, October*, 1843.]

Specification drawn by Messrs. Newton and Son.

To CHARLES BERTRAM, *of the borough and county of Newcastle-upon-Tyne, Esq., for an improved mastic or cement, which may be also employed as an artificial stone, and for coating metals and other substances,—being a communication.*—[Sealed 20th July, 1843.]

THE improved mastic or cement is composed of seventy parts of turf or peat, (from which the greater part of the water has been removed, by pressure or evaporation,) and thirty parts of tar or pitch, (by preference, the tar obtained from gas-works,) which are mixed together, and allowed to rest for some hours; the mixture is then put into a cauldron, or other vessel, and kept boiling for about three hours; and the cement, thus produced, is called, by the inventor, "percollane."

When the cement is used to prevent the "fouling" of ships, by the adhesion of marine shells, plants, &c., an addition is made to every hundred parts, of two parts of common yellow soap, and ten parts of oxide of copper, or any other metallic salt of the like poisonous quality.

When the cement is to be employed as artificial stone, only half the above quantity of turf or peat is used; and instead of the remaining thirty-five parts, an equal quantity of mud or slime, from the bottom of rivers, canals, ponds, marshes, &c., intermixed with a little dry sand, or fine gravel, is added to the mixture, which is treated in the manner above described, and then moulded into blocks or slabs, for paving, &c.

After describing the above invention, the patentee states, that the said mastic or cement is composed of the same materials, and manufactured in the same manner as a certain flux, employed in the manufacture or preparation of fuel, described in the specification of a patent, granted to William Wylam, June 22nd, 1843, and which was communicated to him by the party from whom the mode of preparing the above composition or cement also emanated, for the special purpose of obtaining the present patent; and he (the patentee) does not, therefore, claim the cement and process of manufacturing, so far as regards the application thereof to the preparation of fuel; but he claims the said improved mastic or cement, and the several modifications thereof, before described, so far only as the same may be employed as a cement, or as an artificial stone, or for coating metals and other substances.—[*Inrolled in the Inrolment Office, December,* 1843.]

To DAVID NAPIER, *of York-road, Lambeth, in the county of Surrey, engineer, for improvements applicable to boilers or apparatus for generating steam.*—[Sealed 25th July, 1843.]

THE object of this invention is to prevent the water from passing off in conjunction with the steam, or what is technichally called "priming or flushing;" this the patentee proposes to effect by covering the surface of the water, in the boiler or generator, with one or more tiers (as the case may require) of buoyant substances, such as hollow balls of metal, or of substances that are not buoyant, supported by any mechanical means, in the interior of the boiler. He does not confine himself to any shape or size, but prefers the spherical form, with a diameter of from 1½ to 2 inches.

The effects stated to be produced by the metal balls, are, Firstly,—stilling the water, so as to prevent it from rising up in considerable quantities with the steam; and, Secondly, that the surfaces of the upper tier of balls will serve to intercept the smaller particles of water, and allow the steam to blow off comparatively dry.

The patentee claims the peculiar methods, above described, for preventing priming or flushing, of whatever form or material the substances employed may be made, and whether buoyant, or supported in or above the water.—[*Inrolled in the Inrolment Office, January,* 1844.]

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 454, Vol. XXIII.)

May 30th, 1843.

The PRESIDENT in the Chair.

"On the action of Air and Water, whether fresh or salt, clear or foul, and at various temperatures, upon Cast and Wrought Iron, and Steel."—By Robert Mallet, M. Inst. C.E.

The author in this paper gives the completion of his researches upon this subject, on which he has been engaged for nearly five years, during the intervals of professional avocations.

The experiments, originally undertaken at the request of the British Association, had reference merely to the action of air and water on iron, in various states and under several conditions; but in the progress of research, the author has extended the investigation to many other connected branches of practical importance, such as the several modes, or assumed modes, of protecting iron from corrosion, in which he has proposed improved methods dependent upon known principles, which are developed at length, and which appear likely to be of great importance, in relation to the circumstances affecting the durability and corrosion, whether general or local, of iron ships, to which he has devoted much attention.

The protective powers of various paints and varnishes have also been determined in many conditions, and the peculiar circumstances of corrosion presumed to attach to railway bars, are partially investigated.

The main numerical results of these investigations are given in two volumes of Tables, which show, on inspection, the absolute and relative losses by corrosion, in given times, and under six several conditions of experiments, on nearly all the various qualities of cast and wrought iron, and steel, made at the most important works in Great Britain. During the experiments, the metals were exposed at two several periods of 387 days, and of 732 days respectively, to the action of—

I.	Clear sea water,	at temp.	56° to 58° Fahrenheit.
II.	Foul sea water	,,	ditto.
III.	Clear sea water	,,	110° to 125° ditto.
IV.	Clear river water	,,	32° to 68° ditto.
V.	Foul river water	,,	36° to 61° ditto.

VI. Freely exposed to the atmosphere, and its precipitations, at Dublin.

Tables are also given containing the amounts of corrosion of cast and wrought iron, in sea and fresh water.

I. When coated with zinc, or galvanically protected by its contact.
II. When painted and varnished in various ways.
III. When in contact with various definite alloys of copper and zinc, and of copper and tin, as in brass and gun metal, which are both electro-negative to iron in water.
IV. Of cast iron, with the surface variously modified by the method of coating, as by chilling, &c., or with the surface and coat removed by planing.
V. Of the specific gravities, rigidly ascertained, of all the specimens of cast and wrought iron and steel, experimented on, and determinations, for the first time made, of the changes in density, produced by casting iron under a variable head of metal, and of the effects on density of changes in the mass or bulk of castings in iron; all which, the author has shown, affect the ratio of corrosion of a given sort of cast iron.

These Tables, which the author intends to contain the chief information requisite for the engineer, to enable him in practice to allow for the loss of his structures by corrosion in any given time, and to choose the most desirable irons, &c., are followed by others, which condense into one view the whole results arrived at, and fit them for practical reference.*

Another principal object held in view in the tabulation of these results, and effected by the author, was by discussion of their contents to discover upon what variations in the texture, density or chemical constitutions of the metal, maximum and minimum corrodibility under given conditions depended; for this purpose, numerous exact analyses of the cast and wrought iron, &c., of maxima and minima corrosion, became requisite. These have been made by the author, and are given in separate tables, together with the details of the methods adopted for obtaining correct results; a matter of admitted difficulty in the case of the analysis of iron. These analyses show that corrodibility does not depend upon the proportion of constituent carbon in cast-iron, and still less upon that of the other foreign matters usually found in it; but upon the state in which carbon exists in the compound; upon the state of aggregation of the whole mass; upon the density, and upon the voltaic uniformity, or otherwise, of the surfaces exposed to corrosion.

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* These tables are not susceptible of abstract, but they are being prepared for publication in the forthcoming volume of the Transactions of the Institution of Civil Engineers.

Thus the same sort of cast-iron corrodes much faster, in given conditions, if cooled irregularly, and faster than it does when cooled uniformly and slowly.

Hot or cold blast produces very little difference in corrodibility of cast-iron, and this results chiefly from difference in density; recollecting that carbon exists in cast-iron in two very different states, *viz.*, as diffused graphite in a crystallized form, and as combined carbon; that the dark grey and softer irons contain more of the former, while the harder and brighter irons have more of the latter; that the latter kind have much less uniformity of surface, when cast under similar conditions, than the former; while the highly graphitic irons, though more uniform in large specimens, are the least dense and softest in texture—we arrive hence at the ultimate choice, that the bright grey irons of high commercial value, while they are in all other respects the most useful for construction, are also most durable when exposed to the action of air and water.

The second prolonged period of immersion of all the specimens was necessary, in order to determine the "law of progression of corrosion, with respect to time." The author finds that where the coat of oxyde and of carbonaceous matter or plumbago formed, is constantly removed from the surface of cast-iron exposed to corrosion in air and water, the progression of the latter is a decreasing one, because, as the metal is removed, the inner portions become more uniform in texture, and fewer minute voltaic couples are formed; but where the oxydes and plumbago remain untouched, these being both electro-negative to the metal, nearly equilibrate the effect of the regular texture; and thus the rate of corrosion remains uniform, or is nearly in direct proportion to the time of reaction. This is demonstrated experimentally, and is most forcibly exhibited in corrosion by sea-water. Hence in practice, cast-iron immersed without any protection, will corrode less if occasionally scraped and cleaned; or less in a tideway, than if untouched and in still sea-water.

The rate of corrosion, as dependent on the metal itself, is a minimum when the cast-iron is more uniform and hard, and free from suspended graphite, and as dependent upon the water in which it is immersed; it is a maximum in foul sea-water, and a minimum in clear river water, both being at mean temperature, and containing nearly the same volumes of combined air and carbonic acid.

The kyanized oak boxes, 2 inches in thickness, in which the specimens were immersed in Kingston Harbour, were eaten through in about two years by the *Limnoria terebrans*.

Cast-iron freely exposed to the weather at Dublin, and to all its atmospheric precipitations, was corroded nearly as fast as if in clear sea-water, when the specimens in both cases were wholly unprotected.

The results of experiments on wrought-iron and steel, shew that they consist of two or more different chemical compounds, coherent and interlaced, of which one is electro-negative to the other. The electro-positive body being that which suffers first from corrosion, the electro-negative portions of the iron and steel remain bright, and hold a perfect metallic lustre until the whole of the other portions are removed, or at least are so to a great depth, when they begin likewise to oxydate.

In general, the finer the quality of wrought iron, and the more perfectly uniform its texture, the slower and more uniform is its corrosion in water; minute differences in chemical constitution produce little change in this respect. Highly silicious wrought-iron, however, corrodes very locally, and appears to be partially defended by a thin coat of silex formed on it.

Fagoted scrap bars, made from best Staffordshire rivet iron, was found, of all the irons experimented upon, to be the most durable; next to this was Low Moor boiler plate, and it is thence preferable for iron ship-building.

Foul sea-water, evolving sulphuretted hydrogen, gives the maximum corrosion of wrought iron and steel. The contact of soft putrifying mud appears to be still more destructive.

Steel generally corrodes more uniformly and slowly than wrought-iron. Hardened cast-steel, after "tilting," has the average minimum corrosion, and low shear steel, which is in fact a sort of steely iron, has the maximum.

The author has made researches on the nature of the peculiar carbonaceous substance which he has called "plumbago," formed by the decomposition of cast-iron in sea-water, and in other conditions, and also occasionally from wrought-iron and steel, and on the other organic products of such decompositions. His reasonings tend to shew, that this plumbago in part results from the decomposition of carbonic acid in solution in the water, and is therefore highly interesting to the chemist, as an instance of crystallized carbon being so formed.

The rust produced by the prolonged action of air and water on iron, is brown hæmatite; and omitting all minute or accidental constituents of the iron, its formula is $2\ Fe_2O_3 + 3\ HO$, more or less mixed with spathic iron ore $= Fe O + CO_2$. When very old, these lose water, and become "fer oligiste," or anhydrous peroxide.

The author then discusses the conditions most and least favourable to corrosion in marine steam-boilers, with reference to the degree of saline concentration, boiling temperature, &c., of the sea water; and gives tables of the saline contents at various stages of concentration. Sea-water, to act least on boilers, should be heated to 190° Fahr., and be deprived of air, before entering as feed water, and the less concentration takes place, the less will be the amount of corrosion.

The tables of the amounts of corrosion of cast-iron, in contact with definite alloys of copper with tin and zinc, are now extended to wrought-iron. The corrosion of this is accelerated by the contact of either brass or gun-metal in sea-water, but more so by the latter than by copper.

He confirms his previous results, that, except in atmospheric air, a coating of zinc, or contact of zinc in a massive form, affords to cast or wrought iron only partial protection from corrosion.

In foul sea water, the zincing is converted into artificial blende = (Zn + Fe + S). Elkington and Ruolz's zincing process he finds capable of many useful applications for iron exposed to air; but he questions its efficiency in water, or where there is abrasion.

Zinc paint he states to have been found the most durable of all the paints and varnishes tried, except coal-tar laid on hot, and the asphaltic varnishes.

The author then enters largely into many questions relative to the corrosion and fouling of iron ships, applying to them the laws he had previously deduced. Based on the known effects of a slightly alkaline solution in preventing corrosion, he proposes lime-water to replace bilge-water, and thus to prevent internal corrosion in iron ships. He describes his prolonged experiments on the means of preventing their external corrosion and fouling, and the details of his methods of preventing both. These consist in coating the plates with an alloy of zinc with mercury, and a very minute portion of the base of either of the alkalies. The coating is effected by peculiar methods, to ensure perfect uniformity; and the principle of protection is, that the alloy produces, by the first action of a menstruum, a surface of amalgamated zinc, which is insoluble. This coating is protected by an asphaltic varnish, to prevent the contact of the slightly-soluble poisonous paint, with which the ship's hull is payed over to prevent fouling. Several metallic salts are fitted to act as poisons to the molluscous and testaceous animals which infest ships' bottoms; but the author's experience leads him to prefer oxychloride of copper, which is, in fact, the salt formed on common copper sheathing, and which, by its poisonous qualities, keeps it clean.

The author's method has been in use for some time on vessels which have made voyages to the tropics, and its usefulness in preventing fouling, &c. has been fully proved. He discusses and explains the errors which have been made as to the non-corrosion of ships kept in motion; and shows that corrosion does take place, but that it is not so perceptible as when the ship remains at rest.

He shows that magnetism has nothing whatever to do with the amount of corrosion in iron vessels, and also discusses, at length, various contingent circumstances promoting partial corrosion in iron ships—the nature of cargo, the mode of fastening the machinery, the contact of boilers, of various timbers, and of the same when decayed, &c.; all of which are of practical importance to the iron ship-builder or marine engineer. Kyanized timber is rapidly destructive of iron, in contact with it; in sea-water it more than doubles the rate of its corrosion.

After giving a table, containing the numerical values, for iron ship-building, of a number of qualities of British wrought iron, the author proceeds to discuss in detail the principal methods of protection for iron which have been recently promulgated by Berry, Neilson, Shore, Elkington and Ruolz, Hall of Bermondsey, Crawford, and Fontainmoreau, all of which are patented; but none of them, except that of Elkington and Ruolz, are, he contends, proved to be of practical value in the conditions above mentioned.

Lastly, he states, that as uniform corrosion cannot be ensured in the case of iron ships, and as local action is liable to produce fatal accidents at unlooked-for moments, protection from corrosion and fouling must be considered essential to the safety of iron ships. If so protected, the author contends that they are safer, in every respect, than the best vessels constructed of timber. He also gives instances, from various authorities, of the rapidity with which foulness accumulates on ships' bottoms, even of wood, and more so if of iron; and dissents as to the possibility of removing the fouling of iron ships by any scraping process, unless performed in the dry dock, and constantly repeated.

The communication concludes with some observations as to the presumed differences in the rate of corrosion between railway bars in use and out of use, or traversed in one or in both directions. Upon this subject the author has experiments in progress on several railways; and expects, at a future time, to lay the results, as to the amounts of loss by corrosion and abrasion, before the Institution. At present his belief is, that railway bars, being otherwise in the same condition, corrode alike, whether travelled over or not.

Dr. Ure said, that the part of Mr. Mallet's paper which was most interesting to chemists, was the mode of analysis. This was always a subject of delicacy, difficulty, and labour. His own mode of analyzing cast iron was somewhat analogous to that which had been described. He took a portion of iron, reduced by filing to a fine powder, mixed it with the same quantity of chlorate of potash, and five or six times its weight of clean siliceous sand, to dilute the mixture. This was heated in the usual way, in a combustion tube, with more chlorate of potash, whereby all the carbon contained in the iron was converted into carbonic acid, which was passed through a solution of the sub-acetate of lead, instead of potash water. Carbonate of lead was thus produced; and its amount, when washed and dried, gave the quantity of carbon in the iron operated upon—134 parts of carbonate of lead, indicating 6 parts of carbon. Therefore $\frac{1}{100}$th of a grain of carbon might be detected by this method.

The question as to the state in which the carbon existed in the iron, was more difficult of solution. Karsten's mode of determining this point was very delicate and accurate. The pulverized iron was mixed with moistened chloride of silver, which acted upon the metallic iron alone, leaving the carburet of iron untouched, and its amount could thus be determined with great nicety.

With white iron which could not be filed, the chloride of silver was formed into a mass. A disc of it being placed at the bottom of a vessel with a little water over it, the piece of iron was laid upon it: a few drops of muriatic acid were then added, and in eight or ten days the iron was dissolved, leaving untouched the carbon, which existed in the form of graphite.

Mr. Williams agreed in the advantage of preventing the corrosion of iron vessels, but he feared the expense of the mode proposed by Mr. Mallet, particularly as at present, although comparatively unprotected, they were very durable. He instanced particularly the light boats on the river Shannon, which, although constructed of very thin iron, had been at work between six and seven years, and exhibited no signs of decay.

Mr. Rendel said, that the durability of iron canal boats was well known. On the Tavistock canal there now existed some boats, which had been employed for twenty-five years in carrying coals, iron and copper ores, or other goods, and yet they were not extensively corroded.

Mr. Field stated, that although in India iron generally corroded rapidly, the iron vessels that had been sent there did not appear to be affected sooner than in England. He had been informed by Mr. Laird, that the boilers of the 'Garry Owen' iron steamer had been renewed twice in nine years, and on every occasion it had been remarked, that although the bottoms of the boilers were entirely destroyed, the iron plates of the hull of the vessel, immediately beneath them, retained their original coat of paint, and were not at all corroded.

Mr. Jordan suggested the probability of the hull of the vessel being protected at the expense of the boilers, on account of the electric character of the metal being altered by the heat of the boiler, and the general circumstances induced.

Mr. Field said, that the boilers in question had lasted as long as they would have done on board a timber-built vessel.

Mr. Williams corroborated the statement. The boilers had worn out in the regular time, and had failed first in the usual spot, which was the bent plate where the sides joined the bottom. There was not any thing remarkable in the wear of the boilers.

Dr. Ure thought that the heat of the boilers having probably been sufficient to dry up any moisture from beneath them, might have tended to preserve the hull of the vessel from corrosion in that spot. It was easy to account for a less degree of corrosion taking place in iron ships, or on rails of railways, as long as the former were constantly kept moving, and the latter were regularly travelled over. In these cases, any oxydation which took place was rubbed off as it was formed; but if either were in a state of inactivity, the scale of rust permitted an accumulation of moisture beneath it, an active galvanic pile was completed, and oxydation went on with increased rapidity.

Mr. Vignoles remarked, that the paper did not notice the iron water-tight bulk-heads for vessels, which had been introduced by Mr. C. W. Williams. Their practical utility was now generally admitted, and he believed they were about to be adopted in the navy.

Mr. Williams said, that about nine years since he first introduced the system of dividing the hull into five compartments, by four water-tight iron bulk-heads, with the intention of their adding to the strength of wooden vessels; but it occurred to him that they would be otherwise useful, and although the ship builders opposed it, he persevered, and now all the vessels under his superintendence had them. Their value had been proved on many occasions, and by them the Royal William and several other vessels had been saved. With four bulk-heads it was impossible for a vessel to sink, unless three of the compartments were broken into, which was scarcely possible.

The President believed that the James Watt, which was built at least sixteen years since, had three close timber bulk-heads, intended for the same purpose as the iron ones.

Mr. Williams replied, that they would not answer the same purpose as the iron ones, and that if a vessel had only three bulk-heads, making four compartments, if one of them was broken into, the vessel would sink, but with five compartments it would be saved.

With regard to the general durability of iron vessels, he recollected an iron vessel being built at the Horseley iron works more than twenty years since, which he believed was still in existence; and a small boat, built for him by Mr. Grantham, of very thin plates, in the year 1824, was still at work.

The Secretary stated that the vessel alluded to by Mr. Williams was the 'Aaron Manby,' which was built by, and named after, his father in the year 1821. It was the first iron vessel that ever went to sea; it had been very roughly used, and the engines and boilers had been more than once renewed; yet the hull had scarcely required any repairs, and it was very slightly corroded, although it had been severely tried by being used in both fresh and salt water upon the river Seine, for which service it was built.

It was well known in Staffordshire that many iron canal-boats, which were used indiscriminately for carrying coals, iron-ore, limestone, and other cargoes, and had received scarcely ordinary attention, were upwards of forty years old, and were still serviceable.

Mr. Braithwaite said, that he had recently heard of the sale of a wooden vessel forty-five years old, which was still seaworthy, and was capable of being insured.

The President observed, that although part of two evenings had been devoted to Mr. Mallet's paper, yet that such was its value, that it could scarcely be discussed until members could peruse it at leisure, and enter into the wide field of observation which it embraced. It was a paper of undoubted merit, and the attention of the Publication Committee had been directed to it by the Council, in order to its general circulation, with the former valuable paper, by the same author, as soon as was practicable.

A pair of electro-magnetic signal telegraphs, constructed for the Aix-la-Chapelle Railway, from the plans of Professor Wheatstone, were exhibited.

Professor Wheatstone explained, that the principle of this signal telegraph, which he considered to be the most efficient arrangement for practical purposes, was the same as his last electro-magnetic telegraph, in which a dial, or hand, was caused to advance by the alternate attractions and cessations of attraction of an electro-magnet, occasioned by corresponding alternate completions and interruptions of the circuit, by means of a peculiarly constructed apparatus, placed at the opposite end of the telegraphic line.

The present signal telegraph was intended for the use of the inclined plane on the railway at Aix-la-Chapelle, where only a limited number of signals were required. The entire alphabet of the complete telegraph was therefore dispensed with, and the instrument was restricted to six elementary signals. The letters M, S, C, T, B, &c., on the face of the dials, were the initials of the German words for engine, rope, train, telegraph, &c. The dial was eight inches in diameter, and the characters were conspicuous, so that they might be readily seen at a distance. The hand, which was required to be made very light, and to keep its form, was of blackened mica. The cross being reserved to indicate the quiescent condition of the apparatus, there remained five available characters, which, combined two and two, gave twenty-five signals— a number amply sufficient for the purposes of the railway. It being established as an invariable rule that each signal should consist of two characters, followed by the cross, were the telegraph to act in any way irregularly, the index would, at the end, point to some other character, instead of the cross, and this would indicate that the preceding signals were wrong, so that if the signals received should not correspond with those sent, (which, however, could not be the case if ordinary care was taken,) no mistake could possibly arise, because they carried with them the evidence of their error. The instruments were furnished with a simple means of bringing the hand immediately to the resting point, without interfering with the circuit. As it might be occasionally required to transmit a permanent signal, which should remain until a person arrived to inspect it, the five simple characters could be employed for this purpose.

The instruments at each station consisted of a telegraph, an alarm, and a communicator; they would be arranged in the circuit in several ways, to suit particular purposes, but no other alteration was requisite to effect this, than a change in the disposition of the terminal wires, and of their connexions with the communicators. The telegraphs might be so placed, that they would act simultaneously when either of the communicators was worked, or they might be so arranged that the instrument at one station should only be acted upon by the communication at the other, which, in many cases, was preferable, as a great resistance was thereby taken out of the circuit. Other arrangements, useful under particular circumstances, were also practicable. This telegraph, even when all the letters of the alphabet were employed, required only a single circuit of communications between the two stations. Professor Wheatstone's former permutating magnetic needle telegraph, though possessing a power of combination far exceeding that of any preceding telegraph in which magnetic needles were proposed to be employed, required a number of wires proportionate to the number of signals.

By employing the earth, or an extent of water, to return the current, or complete the circuit,—which might be done by connecting the two extremities of one of the communicating wires with plates of metal, and plunging them into the earth or into water,—one of the communicating wires might be entirely dispensed with; this plan would be adopted at Aix-la-Chapelle.

That a large extent of earth, or a portion of a river, could be made to complete an electric circuit, was long since established with respect to electricity of high tension, by the extensive experiments of Dr. Watson, in 1748, and others; and the same thing was proved with regard to voltaic electricity, by the independent experiments of Erman, Basse, and Aldini, made in 1803. Erman's experiments were made in the river Havel, near Potsdam; those of Basse in the river Weser, and the environs of Hamel; and Aldini's researches were prosecuted on the shore near Calais. Professor Steinheil also employed the earth as a means of completing the circuit, in the electro-magnetic telegraph which he established at Munich in 1838.

A pair of Professor Wheatstone's telegraphs were established at Berlin in the beginning of 1842: the line of communication was a single wire, carried through the air upon wooden posts, and plates of metal attached to the ends of the wire were buried in the ground. In the same year he formed a communication between King's College and the shot tower on the opposite side of the river: the communicating wire was laid along the parapets of Somerset-house and Waterloo-bridge, and thence to the top of the tower, where one of the telegraphs was placed. The wire then descended, and a plate of zinc attached to its extremity was plunged into the mud of the river; a similar plate was attached to the extremity at the north side, and was immersed in the water. The circuit was thus completed by the entire breadth of the Thames, and the telegraphs acted as well as if the circuit was entirely metallic.

The peculiar construction of the present signal telegraph, enabled a magneto-electric machine to be substituted for a voltaic battery. This source of electric action not being subject to cessation or diminution, the attention necessary for keeping a voltaic battery in order was dispensed with, and the instruments were always ready for action, without any previous preparation.

June 13th, 1843.

The President in the Chair.

"Description of a Plan, adopted for carrying off an accumulation of Water from the Warehouses, Cellars, &c., near the Wet Dock at the Port of Ipswich."—By George Hurwood, Assoc. Inst. C. E.

The paper states that in consequence of the formation of the wet dock at Ipswich, the water from the land-springs, which was formerly carried away by the river, accumulated to such an extent, as to cause serious inconvenience to the owners of the warehouses, cellars, &c., many of them being beneath the level of the ordinary tides. It was difficult to find a remedy for this, as nearly the whole of the line, affected by the water, was at so low a level, that a discharge could only be effected at the lowest ebb of the tide, and a general sewer could not have been constructed at a moderate expense, because, from the lowness of the level, water would have accumulated constantly in it, and any casual increase from rain or other causes, would have been sufficient to inundate the adjoining buildings.

The plan designed by the author, and which has been executed, had for its object the construction of a sewer which should drain these buildings alone, and at the ebb tide should carry off the accumulated water, being at the same time of sufficient size to contain the water, which was prevented from being discharged by the flowing tide. It was required therefore to be water-tight, and branch drains were necessary from all the points where water penetrated.

To insure the success of the plan, every precaution was taken for preventing the influence of the tide in the general sewer, retarding the discharge or operating upon the lateral sewers.

At the end of the main sewer was placed a cast-iron frame, upon which were hung three tide-flaps with brass facings, accurately fitted, and balanced by levers and counterweights. By this means the water was discharged at any height, and without any considerable head of water being required to open the flaps. Each cellar was connected with the main drain by an iron pipe, with a well-balanced valve at its end, so that the water could have an easy exit; but as soon as any accumulation within the sewer occurred, the valves closed.

The sewers were built of brick, in mortar made from blue lias lime. The dimensions varied from 12 inches to 24 inches in diameter, and the cost of the latter size was 12*s.* 8*d.* per yard, including excavating, laying, filling, &c.

The plan is stated to have proved very successful, and as particular regulations are enforced, to prevent any admission to the sewers of other than the water which filters through the natural strata of the chalk-basin, the water in the sewers is fit for domestic or manufacturing purposes.

The communication is illustrated by a drawing, showing the situation of the town and dock of Ipswich, with the extent of the lines of sewers, and the details of their construction, and that of the tide and other flaps.

"Description of a Mode of obtaining the perfect Ventilation of Lamp-Burners."—By James Faraday.

The paper commences by stating, that in consequence of the injury sustained by the books in the library of the Athenæum Club, and the complaints made by the members of the vitiated state of the air in the rooms, the attention of Professor Faraday was drawn to the subject, and that he suggested the trial of various plans for effecting the removal of the products of combustion, and for the ventilation of the lamp-burners.

The author then assumes, that all substances used for the purpose of illumination, may be represented by oil and coal-gas; for although tallow and wax are also employed, yet as they cannot be burnt until they are rendered quite fluid like oil, they may, for all practical purposes, be classed with it.

Oil and gas both contain carbon and hydrogen, and it is by the combination of these elements with the oxygen of the air, that light is evolved. The carbon produces carbonic acid, which is deleterious in its nature and oppressive in its action, in closed apartments, and the hydrogen produces water. A pound of oil contains about 0·12 of a pound of hydrogen, 0·78 of carbon, and

0·1 of oxygen; when burnt it produces 1·06 of water, and 2·86 of carbonic acid, and the oxygen it takes from the atmosphere is equal to that contained in 13·27 cubic feet of air. A pound of London coal-gas contains on an average 0·3 of hydrogen and 0·7 of carbon; it produces, when burnt, 2·7 of water and 2·56 of carbonic acid gas, and consumes 4·26 cubic feet of oxygen, which is equal to the quantity contained in 19·3 cubic feet of air.

A pint of oil, when burnt, produces a pint and a quarter of water, and a pound of gas, more than two and a half pounds of water; the increase of weight being due to the absorption of oxygen from the atmosphere, one part of hydrogen taking eight parts (by weight) of oxygen to form water. A London Argand gas lamp, in a closed shop window, will produce, in four hours, two pints and a half of water. A pound of oil also produces nearly three pounds of carbonic acid, and a pound of gas two and a-half pounds of carbonic acid. For every cubic foot of gas burnt, rather more than a cubic foot of carbonic acid is produced. As carbonic acid is a deadly poison, an atmosphere containing even one-tenth of it is fatal to animal life. The various accidents from lime and brick-kilns, brewers' vats, occasionally from the sinking of wells, and from the choke damp in coal mines, attest the danger contingent upon the presence of this substance. A man breathing in an atmosphere containing seven or eight parts of carbonic acid would suffer, not from any deficiency of oxygen, but from the deleterious action of the carbonic acid.

M. Leblanc has recently analysed carefully the confined air of inhabited places, and concludes, that the proportion of carbonic acid gas in such places may be regarded as measuring with sufficient exactness the insalubrity of the air; that in the proportion of 1 part to 100 of air, ventilation is indispensable for the prevention of injury to the health; that the proportion of carbonic acid gas should not exceed a five-hundredth part, though it may extend without inconvenience to a two-hundredth part. If a room twelve feet square and twelve feet high, with the doors, windows, and fire-place closed, has a gas lamp burning in it, consuming five cubic feet of gas per hour, the light will produce sufficient carbonic acid, in rather more than three hours, to be in the proportion of 1 part to 100 of air, and, as Mr. Leblanc states, when in such condition the air is decidedly injurious to health: and even in one hour and a-half it will produce that proportion of carbonic acid which he considers should never be exceeded.

The experiments which were made, led to a modification of the ordinary mode of ventilating by ascension, and finding that there was sufficient draught in the main part of the metal chimney to allow of a descending current over the lamp, the tube, instead of going directly upwards, was made to turn short over the edge of the glass, to descend to the arm or bracket, to pass along it, and then ascend at the central part of the chandelier, or against the wall, if applied to a single light. To this succeeded another form, which is very simple, and is in fact only a correct application of the principle of a descending draught to a lamp-burner.

The gas-light has its glass chimney as usual, but the glass-holder is so constructed as to sustain not merely the chimney, but an outer cylinder of glass larger and taller than the first: the glass-holder has an aperture in it, connected by a mouthpiece with a metal tube, which serves as a ventilating flue, and which, after passing horizontally to the centre of the chandelier, there ascends to produce draught and carry off the burnt air.*

With a lamp burning in the ordinary way, the products of combustion issue from the top of the glass chimney into the apartment; but if the above arrangement be applied, on closing the top of the outer glass cylinder by a plate of mica, all the soot, water, carbonic acid, sulphurous and sulphuric acid, and a portion of the heat, are carried away, and discharged into a chimney or into the open air; and the air in the rooms may thus be kept as fit for the purposes of respiration as if artificial light were not being used.

A curious result of the enclosed lamp is the increase of light produced, amounting, it is stated, to from 10 to 20 per cent., according to circumstances, the same quantity of gas being consumed as before.

Professor Faraday illustrated the principle of the invention by several experiments; first demonstrating, that if a lighted taper were applied to the top of a lamp chimney, it would be instantly extinguished, or a glass jar held over it would be immediately filled with air in which a light could not burn nor any animal exist. If a portion of lime water was poured into the jar it became turbid in appearance, owing to the precipitation of the carbonate of lime formed by the combination of the carbonic acid with the lime. The sulphurous and sulphuric acids also contained in the water resulting from the combustion of coal-gas, were injurious to metals and to articles of furniture. He then explained, that, at his suggestion, the gas-lights of the chandelier in the Library of the Athenæum were ventilated by tubes dipping into the lamp glasses, and conjoining at a short distance above into one central pipe, which carried away all the burnt air from the room.

This first application had demonstrated the correctness of the theory, and had induced modifications which had been described in the paper.

The Professor then stated, that his attention had been directed to the subject also by the disadvantages attendant upon the want of ventilation in the lanthorns of Lighthouses, as, in consequence of the condensation of the products of combustion upon the windows, the intensity of the lights was diminished to a serious extent, and the quantity of carbonic acid in the lanthorns was at times so great that the keepers could with difficulty enter them. This was illustrated by an experiment, showing the difference between allowing combustion to give its products to the air of a room, and carrying off those products freely to the exterior.

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* We shall give a more particular description of this lamp in an early number.—Ed. L. J.

A short wax candle was placed burning on a plate, a glass jar put over it; and the upper aperture of the jar closed by a globular cork, through which was passed a piece of glass tube, about half an inch in diameter and twelve or fourteen inches long, the tube descending to the top of the candle flame, and being placed just above it. Under these circumstances, plenty of air passed into the jar between its edges and the plate, and out by the tube, to supply all that was needed for combustion, and to keep the glass chamber clear: therefore, in that position it would burn for any length of time, and the jar remain quite bright. But on moving the cork a little, so that the tube should no longer be over the flame, all these results changed, though the air-ways remained exactly as before. The candle then gave the products of its combustion to the general air of the glass chamber, which immediately became dull from the water deposited upon it; the air itself was deteriorated, the light grew dim, and in a few minutes it went out; but if that was prevented, by the tube being again placed over it, signs of recovery appeared, the light resumed its former brightness, and after a short time even the dew disappeared from the glass, demonstrating how indispensable a perfect ventilation was for lighthouses; on which subject the Professor promised a communication.

Mr. Bethell remarked, that the inner chimney appeared to become dim after the light had burned some time.

Professor Faraday explained that this might arise from several causes. He apprehended it was chiefly occasioned by the action of the sulphur in the coal-gas upon the ingredients of which the glass chimney was composed. In oil-lamps the same effect was observed, but not so speedily as with coal-gas. The Trinity House suffered much by it, and had made experiments on various qualities of glass for the chimneys of the lamps of lighthouses. Chimneys formed of mica would not be so affected, but they were not so transparent as glass.

Mr. Bethell said that the Bude light, as now used in the House of Commons, was constructed somewhat on the same principle as had been described in the paper, except that the current was directly upward, which rendered the application of two chimneys unnecessary. Perfect ventilation was obtained by it.

Professor Faraday said that the Bude light, as proposed to the

Trinity House, was an oil lamp, supplied with oxygen by an apparatus for generating it. In lighthouses, it was indispensable that the lamps should be so arranged that the lights should consume only a given quantity of oil, and retain an unvarying degree of brightness for a given time, which was now four hours, at the end of which time they were trimmed. It was found that, with the Bude light, the quantity of oil consumed was greater, and the lamps required trimming in two hours, in consequence of the wicks charring: these circumstances rendered the system inapplicable to lighthouses. Subsequently, five of the Bude-light lamps had been referred to him by the House of Commons for experimental purposes, and his observations upon them were of the same nature.

Mr. Bethell explained, that in Mr. Gurney's present "Atmospheric Gas-burner," the supply of oxygen alluded to by Professor Faraday was not used.

Mr. Snow Harris inquired whether the action of carbonic acid, to which the term "poisonous" had been applied, was to be considered as positive or negative. How was it to be viewed in its connexion with the circulation of the blood and with the process of respiration?

Professor Faraday replied, by quoting from the work of Dr. Marshall Hall*, that "It was first distinctly stated by Sir Humphrey Davy, that in inspiration and during the pulmonic circulation, the double function was performed of—1st, the absorption of oxygen, and 2nd, the exhalation of carbonic acid, by and from the circulating blood, a doctrine from which another doctrine flows, viz., that during the systematic circulation, the oxygen absorbed is continually undergoing the transition into carbonic acid." The general conclusion from his experiments was, "That respiration was a chemical process, the combination of phosoxygen (oxygen) with the venous blood, and the liberation of carbonic acid and aqueous gas from it.

Professor Graham, in a note to Dr. Hall, says, "If an animal were to breathe atmospheric air to which carbonic acid were added, in proportion to this addition, the evolution of carbonic acid from the blood would in my opinion be impeded; the passage of the carbonic acid outward, at all from the blood, depending upon the comparative absence of that gas from the air taken into the lungs."

In treating of "asphyxia," Dr. Hall says, "The absorption of oxygen, or the evolution of carbonic acid, or both, are impeded or interrupted in every case of asphyxia. From the want of oxygen the blood is deficient in stimulus; by the presence of carbonic acid it is positively poisonous."

It appeared from the researches of physiologists, that the presence of a certain proportion of carbonic acid was necessary to stimulate the action of the heart, and regulate the circulation of the blood; that nature kept up the proper supply for this purpose, but that any excess was prejudicial.

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* "The Gulstonian Lectures for 1842," pp. 8, 12, and 40.

Acting upon this principle, Dr. Payerne had brought forward a proposition for purifying the air in a diving-bell, so that without using the air-pump the diver might remain under water for four hours, or even longer. This was, the professor believed, accomplished by decomposing the carbonic acid, absorbing the carbon, and eliminating the oxygen, and not by generating oxygen, as had been generally imagined.

"On the Formation of Embankments for Reservoirs to retain Water."—By Robert Thom, M. Inst. C. E.

After describing a model, designed to show that the proper slope for reservoir embankments, should not be less than three to one on the water-face, and remarking that waves act more severely on the pitching or paving of the inner face, in proportion to the steepness of the slope, the author proceeds to describe in detail the mode of forming embankments. The foundation is excavated to such a depth as is found firm and capable of preventing the passage of water; then spreading alternate layers of puddled peat, or alluvial earth and gravel, and beating them together with wooden dumpers, until they are completely mixed; the slopes are covered with a puddle made with small stones or furnace-cinders mixed with clay, so as to prevent the possibility of moles or other vermin penetrating into the embankment. He condemns the practice of forming embankments with puddle-trenches, and refers to many reservoirs made by him at Greenock, Paisley, and elsewhere, the banks of which have stood the test of time without having any puddle trenches in them; and particularly mentions one at Greenock, which remained firm and sound, after a rush of water passing over it at a height of ten feet, caused by the breaking down of the embankment of a reservoir situated about 150 yards above it. He recommends, instead of the puddle-trenches, that the whole of the inner part of the embankment should be made water-tight during the formation of it, by which means it will more effectually resist either any casual injury, or any effect of the swelling of the puddle-trench. The paper is entirely of a practical nature, and is intended to illustrate the author's peculiar views, founded on his long experience. It is accompanied by a diagram of the model used in his experiments.

ON THE LAWS RELATING TO LETTERS PATENT FOR INVENTIONS.

No. XII.

THE PATENT LAWS OF SAXONY.

In speaking of the Patent Laws of Prussia, Wurtemberg, Bavaria, and other German States, we stated, that nearly the same spirit on the subject of patents animated the whole German Confederation, and that this spirit was one of exclusiveness and rigour, especially against foreign inventors and inventions.

Although we are not aware that any general law, bearing on this subject, and binding upon the whole German Confederation, was enacted, until within the last six months, and prior to the one given below, still all the States seem to have acted upon one uniform system, and in perfect accordance with one another.

In the course of last year, the Confederation found it necessary to come to some settled arrangement as to the fundamental principles upon which patents for invention should be granted in the Union; and accordingly certain articles were agreed to, and adopted, without however binding the several States to the manner of carrying out the minor points, such as the rules, practice, and forms, to be observed; and also the fees and taxes, payable to Government, in order to obtain patents or exclusive privileges, as they are sometimes termed. The following is a translation of this document, which was agreed to on July 31st, 1843. This general law, affecting the whole German Confederation, is followed by a supplement thereto, issued by the Government of Saxony, as the law of that country on all minor points. These two documents comprise all the legislative enactments in force in Saxony, in relation to patents for inventions:—

July 31*st*, 1843.

Public Notice of the Fundamental Principles to be observed in the States of the German Commercial Confederation, or Zollveerin, with respect to the granting of Patents and Privileges for Inventions.

As soon as the following fundamental principles, relative to the granting of patents and privileges for inventions (as given below), are added to, or incorporated with, the treaty or agreement, entered into by the several States, united for the purpose of establishing fixed and uniform regulations in commercial affairs, and ratified on September 21st, 1842, the same are to be made generally public.

Dresden, July 31, 1843.

Ministry of the Interior,

NOSTITZ and JANCHENDORF.

DEMUTH.

In consequence of a proviso, made at the conclusion of the commercial union treaty, relative to the agreement to, or acceptance of, fundamental principles concerning patents or privileges for inventions, the following rules have been agreed upon and concluded by all the States united for fiscal and commercial purposes, and the said regulations are to remain in force during the continuance of the commercial union.

Every State is still at liberty to act according as it may think most desirable in granting patents or privileges, for the exclusive enjoyment of new discoveries connected with manufacturing industry, whether by issuing privileges for native inventions, and which are to be called patents of invention *(Erfindungs patent)*, or privileges for introducing foreign inventions, denominated patents of introduction or importation *(Einführungs patent)*; these grants must, however, be subject to proper regulations. The United or Confederated States, however, declare their intention, in the first place, of obviating or removing, as much as possible, all difficulties and restrictions upon the freedom of general intercommunication, which may arise from the exclusive privileges above mentioned; and, on the other hand, of bringing into operation the following fundamental principles concerning the peculiar nature of patents, in order to obtain uniformity in the principal points, and in accordance with the proviso or agreement made at the introduction and formation of the commercial union treaty.

SECTION I.

ART. I. Patents shall only be granted for such objects as are really novel and peculiar in their nature. Patents must not be granted for objects which have been already introduced, are in general circulation or use, or are in any way known within the territories of the Confederated States.

ART. 2. All inventions which are already described in works published at home or abroad, in German or in any foreign language, whether in words or by means of drawings,—if any person, comprehending the description, is enabled to carry the invention into effect, are particularly excluded from these privileges, and from becoming the subject of patents.

ART. 3. The determining as to the novelty or utility of any object for which a patent is requested, is left to the judgment and discretion of the several States individually.

Art. 4. For an object which has been recognized as the invention of a subject of the States of the Union, and for which a patent has been obtained in any one of those States, no patent shall be granted in any other State, except to the original inventor, or his legal successors or assignees.

SECTION II.

Art. 5. A patent can likewise be granted, subject to the provisions of Section I., for improvements upon an invention already known or protected by a patent, so far as the alterations include something new and peculiar. Such a patent, if it relate to an object already patented, shall in no wise prejudice the previous patent; and a legal right, or licence, must especially be obtained from the original inventor, for the use or enjoyment of the advantages to be derived from the previously privileged invention.

SECTION III.

Art. 6.—The granting of a patent must never henceforth establish a right to forbid or restrain—

(*a*) The introduction of any articles which may resemble that for which a patent has been granted.

(*b*) The purchase or sale of the same.

Nor shall the patentee possess the right of prohibiting—

(*c*) The use or consumption of such articles, if such should be procured from himself, or from other parties, with his consent,

with the following exception of—

Machines and implements employed in the arts, manufactures, and the mechanical trades, and not destined for the use and consumption of the public in general.

SECTION IV.

Art. 7. Each individual Government is empowered to grant within its own territories to the patentee—

A right to the exclusive manufacture or exportation of the article in question.

Art. 8. In like manner each State is empowered to grant to any patentee within its own territory—

The right of the exclusive use or application of—A new invention in the arts or manufactures, or—New machines or mechanical implements,—and likewise the right of preventing the use or enjoyment of the invention, or the use of the articles for which a patent has been granted, to all those who have not obtained a licence or right from the patentee to use or employ the invention, if they have not procured the patented article from him.

SECTION V.

ART. 9. Any subject of the other States of the Union shall, in each State, be treated in the same manner as if they were subjects of that State, with respect to the matter of granting patents, and the powers derived from, or obtained by, possessing them.

ART. 10. Obtaining a patent in one State shall by no means become a valid consideration whereby a patent should not be refused for the same object in other States. The decision of the question, whether an invention is suitable or not, or deserves the protection of a patent, remains at the free discretion or option of each State, within the limits of the Confederated States, according to the principles it may consider advisable, and without being in any way restrained or bound by the precedents of other States.

SECTION VI.

ART. 11. If after a patent has been granted, evidence should be produced that its novelty and peculiarity have not been substantiated, the patent or privilege shall be withdrawn and annulled.

ART. 12. In cases where the patented article has been previously known to individual persons, but has been kept secret by them, the patent shall remain in force against other parties, if not nullified by any other causes or circumstances, but without any effect towards the above-mentioned persons who have been prior users.

SECTION VII.

ART. 13. The granting of a patent in any State of the Union, together with a declaration of the object, the name, and residence of the patentee, and the duration of the patent, is immediately after the grant to be published officially in the public journals appointed for this and similar purposes.

ART. 14. Prolonging the duration of a patent, or withdrawing or annulling one, from any cause, before the expiration of the time originally specified, must also be officially published in the public journals.

SECTION VIII.

ART. 15. All the States of the Union shall furnish one another, at the end of every year, with complete lists of the patents granted during that period in that particular State.

Supplementary Instructions, published by the Government of Saxony, in addition to the public notice of July 31st, 1843, concerning the Fundamental Principles to be observed in the States of the German Confederation and Customs' Union, with respect to the granting of Patents and Privileges for Inventions.

Art. 1. In the kingdom of Saxony patents will be granted for new inventions connected with manufacturing industry, whether the patents relate to a native invention or the introduction of one from a foreign country, on condition, however, that after the examination (by experienced and competent persons, who are pledged to secrecy) of the drawings, description, or model of the invention in question, which must be presented with the petition for a patent, at the office of the Ministers of the Interior, by the petitioner, not merely its novelty, but also its utility and suitability for its particular purpose, are made evident, and that a profitable and beneficial application of the same to the native manufactures may be anticipated.

Art. 2. The duration of patents is limited, under ordinary circumstances, to five years; but when an invention of considerable importance is brought forward, the introduction and propagation of which, in the kingdom of Saxony, are desirable, but which invention will require a longer time to carry out and bring into efficient operation, and convince the manufacturers concerned, of its advantage, and thereby to incite them to apply and use it,—then, under these circumstances, a longer period will be granted, which must not, however, exceed ten years, except for very weighty reasons and by special permission.

Art. 3. In cases where the petitioner does not belong to the States of the Union, a native is required to make the application as the holder of the patent which is granted in his name.

Art. 4. As a condition of the validity of the patents, the privileged invention is required, according to the rule, to be worked and carried into effect within a specified period, generally limited to one year.

Art. 5. The holding a patent for an invention by no means affords the patentee the privilege of exercising any trade or manufacture, but merely the right of excluding others from the making or carrying into operation the privileged invention.

Art. 6. Permanent and fixed taxes upon patents do not exist in Saxony; but, on granting a patent, the customary issue, and stamp duties, and fees, are to be paid, which are graduated according to the extent of the privilege and importance of the article or invention.

Scientific Adjudication.

VICE-CHANCELLOR'S COURT.

Before Sir James Wigram.—November 14th and 17th, 1843.

BOTTEN *v.* SMITH.

This was an application to dissolve an injunction, obtained in September last, to restrain the defendant from using an invention of "a certain improvement in gas-meters," for which letters-patent were granted to the plaintiff in 1840.* The invention referred to consists of an arrangement of parts for keeping the water at its proper level in the meter (loss from evaporation always excepted), so that, should any excess of water be introduced, such excess will overflow into a waste or discharge-pipe, provided for the purpose.

The counsel for the plaintiff were Mr. Russell and Mr. Collins; and for the defendant, Mr. Campbell and Mr. Webster.

The defendant contended, that the invention claimed by the plaintiff, under his patent, was not new, of which the plaintiff must have been aware, if he had used any reasonable means for obtaining information; a meter, upon the same principle, having been described in a work on gas by Mr. Accum, and made by various houses in the trade since the publication of that work,—that the specification was couched in such vague terms, that no workman could have produced the result stated, by making a machine according to the specification; at least, without such modifications as his experience would suggest,—that the terms used in describing the invention and claiming the benefit of it, were so large and indefinite, that it actually included, or might, at the option of the plaintiff, be made to include machines previously in use. For example, the plaintiff stated that he did not claim as his invention the particular form of the gas-meter, "so long as the general system of action and beneficial effect is obtained in any other way;" and he also claimed to modify or dispense with any of the particular arrangements which he had described. The plaintiff in this manner attempted to reserve to himself the right of claiming any previous or subsequent construction of the meter. The defendant also contended that there had not been such previous length of enjoyment of the patent, as to entitle the plaintiff to the interference of this court by injunction.

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* See p. 354, Vol. XXIII.

The plaintiff, on the other hand, insisted that the specification was sufficiently clear without descending to the mere rudiments of science, which every workman must be supposed to know,—that the gas-meter produced by the defendant, to prove that the invention was not new, had never been in use, and was fabricated for the purpose,—and that the gas-meters complained of as having been made by the defendant, contained a distinct application of the plaintiff's invention.

In delivering judgment, his Honour said that he had compared the plaintiff's gas-meter with Cochrane's meter, but it was unnecessary to state the result of that comparison. Unless the affidavits of Mr. Wood and Mr. Ellis, two of the persons whose evidence had been brought before the Court, were to be wholly discredited, the gas-meter made by Wood was in use before the date of the plaintiff's patent. If he were right in this opinion, the case must fall within the rule laid down by Lord Cottenham,—namely, that where there existed a ground for trying a right, he could not grant an injunction until the plaintiff's right had been established at law. He must therefore dissolve the injunction; the plaintiff being at liberty to bring an action, and the defendant being required to keep an account of the meters made and sold by him.

Mr. Collins then applied to the Court for an order that the gas-meter, produced and described as Wood's patent, might be impounded, in order that the plaintiff might have an opportunity of taking legal proceedings against the parties deposing to its authenticity.

His Honour refused to make the order, observing that the Court had no power to take possession of the meter, which was not the property of either of the parties, but of one of the witnesses.

Before Sir Lancelot Shadwell.—16th November, 1843.

HILL AND ANOTHER *v.* MUNN AND ANOTHER.

Mr. Bethell (with whom was Mr. Hare) appeared for the plaintiffs in this case, Messrs. Hill and Cheetham, and stated that he had humbly to move his Honour, upon notice, for a special injunction to restrain the defendants, who are cotton-spinners and manufacturers at Bacup, from making or using a certain apparatus applicable to machinery used in the preparation of cotton and other fibrous material for spinning, for the purpose of compressing such cotton or other material with greater and more equal density and compactness into the can or other vessel, into which it is received from the rollers of the carding-engine and drawing-frame; and which apparatus consists of the application and arrangement of a reciprocating weight, and is well known amongst cotton-spinners as "Hill's patent can-presser, or plunger."

It appears that a patent for the above apparatus was granted to the plaintiff, Mr. Hill, the inventor, in March, 1838,* and that Mr. Cheetham, of Stalybridge, subsequently became a partner with him in the profits and benefit arising therefrom. Previously to the plaintiff Hill's invention, it was the ordinary practice to press by the hand the cotton or other material as it was delivered into the cans from the rollers of the carding-engine and drawing-frame; which method required a large amount of labour, and was otherwise objectionable, from the impossibility of compressing by hand-pressure so large a quantity of cotton into the cans, as can be done by the plaintiffs' apparatus, as well as from the impossibility of regulating the speed of the hand's descent into the can, so as to correspond with the delivery of the silver from the rollers, and the consequent liability which existed of the sliver being stretched or elongated; but by means of Mr. Hill's invention, the labour theretofore necessary in the preparation process was very considerably reduced, and the quality of the sliver materially improved, both by reason of the greatly-increased quantity of cotton, which, by the use of the reciprocating weight, may be compressed into the cans, and the consequent less change of cans, and less frequency of piecings, and also by the avoidance of the imperfections and unevenness arising from the irregularity of the pressure, necessarily attendant upon that operation by the hand.

The plaintiffs had enjoyed the use and advantages of the invention uninterruptedly from the granting of the patent until some short time since, and had, in fact, received patent premium from about 300 spinners for permission to use the apparatus; but having discovered that several parties were using the apparatus without licence, and in defiance of their patent right, legal proceedings were taken against several of the infringers, most of whom, on the commencement of actions against them, paid damages and costs. Two or three, however, against whom such proceedings were taken, held out, and pleaded to the actions, and it then came to the plaintiffs' knowledge that the defendants in those actions, the defendants in this cause, and several other cotton-spinners, had entered into a society, or union, to contest the validity of the patent, and had subscribed a sum of money to defray the expenses. Mr. Robert Munn, one of the defendants in this suit, was chairman of the society, or union; and the plaintiffs, feeling strong in their right as patentees, thought that the best mode of testing that right was to place themselves in collision with the apparent head of the society, as the parties best informed upon the subject of any objections that might be imagined to exist against the validity of the patent, and therefore filed their bill against the defendants, Messrs. Robert and John Munn, for an injunction. Before the day appointed for hearing the motion, however, the defendants sought an arrangement with the plaintiffs, stating that they were fully satisfied of the great utility of the patent, and that they were unwilling to contest its validity further, if terms, on which they might use it, could be arranged; and terms were thereupon proposed, both with regard to the defendants in this suit and in all the pending actions; and it was arranged that the defendants should pay all costs—that the plaintiffs should grant them a licence upon payment of a certain amount, by way of patent right—and that the injunction should pass against the present defendants, not to use the apparatus, except with the plaintiffs' licence. Under these circumstances, therefore, the learned counsel stated to his Honour that the defendants desired publicly to state to the court, through their counsel, Mr. Bacon, that they (the defendants) undoubtedly violated the plaintiffs' patent unwittingly; that they were fully satisfied of its great utility—so satisfied of that, and the validity of the patent, that they were desirous themselves of taking a licence from the plaintiffs; that the defendants were also willing to pay the whole of the expences which the plaintiffs had incurred; and that therefore the injunction must be granted to restrain the defendants from working the process, otherwise than under a licence from the plaintiffs.

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* For description of this invention, see Vol. XXIII., p. 427.

Mr. Bacon said he was instructed, on behalf of the defendants, to acquiesce in the application. The violation by the defendants of the plaintiffs' rights as patentees, had taken place first through ignorance of the existence of the patent, and had afterwards continued under the impression that the patent was invalid; but that having made inquiries, they (the defendants) had satisfied themselves of the validity of the patent, and had arranged with the plaintiffs for a licence to use the apparatus; and he (the learned counsel) only desired that the injunction might not be framed in such terms as to preclude the defendants from taking a licence from the plaintiffs.

This was agreed to, and the injunction granted accordingly.

Mr. Wolley Foster, solicitor, appeared for the plaintiffs; and Messrs. Sale and Worthington for the defendants.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1843.

Dec. 29. *Henry Laxton*, of 52, Bold-street, Liverpool, for a graduated beam weighing-balance.

1844.

Jan. 1. *Joseph Wragg*, of Radbourne, for an improved plough.

2. *Thomas Edwards*, of Islington Foundry, Birmingham, for a right angle beam steam-engine.

4. *Mark Freeman*, of Sutton Common, Surrey, for a drill and instrument, to be used in the place of the bow and band now employed.

4. *Eli Richards*, of 95, New Park-street, Borough, London, for an improved coal-basket.

5. *J. & S. Dainel*, of 208, Mosley-street, Birmingham, for a flush table fastener.

8. *Richard Hoyle*, of Louth, for the Neptune chariot, or marine life-preserver.

10. *Cruse Horn*, of Oxford, for steam cooking apparatus.

12. *Robert Burton*, of Bolton-le-Moors, for a double tappet, or excentric, for the Jacquard loom.

15. *James Bickerton, Jun.*, of 36, Stamford-street, Blackfriars, for an elastic dress and opera hat.

16. *Andrew Shanks*, of 22, Friday-street, London, for an improved ratchet drill.

17. *William Cowan*, of Glasgow, for an improved drum for gas-meters.

19. *C. J. Redpath*, of Commercial-road, Limehouse, for a portable safety furnace.

20. *William Bouch*, of Sheldon Works, near Darlington, for an improved spring for railway and other carriages.

Jan. 22. *John Leberecht Steinhaeuser*, of No. 5, Symonds' Inn, Chancery-lane, London, for "the Albert vest."

24. *William Palmer*, of 144, Western-road, Brighton, for a vertical filter.

Notwithstanding there appear, in the above list, several mechanical constructions or machines, we beg the public to particularly observe, that the Act under which they have been registered, affords no protection whatever to such inventions.—Ed.

List of Patents

Granted for SCOTLAND, subsequent to December 22nd, 1843.

To Henry Austin, of 87, Hatton Garden, London, civil engineer, for a new method of glueing or cementing certain materials for building and other purposes.—Sealed 26th December.

Francis L'Estrange, of Dawson-street, Dublin, surgeon, for improvements in hernial trusses, to prevent the descent of hernia through the internal as well as the external ring.—Sealed 26th December.

Charlton James Wollaston, of Welling, Kent, for improvements in machinery for cutting marble and stone,—being a foreign communication.—Sealed 26th December.

George Gwynne, of Regent-street, London, and George Ferguson Wilson, of Belmont, Vauxhall, London, for improvements in the manufacture of candles, and in apparatus for, and processes of, treating fatty and oily matters, to obtain products for the manufacture of candles, and other uses.—Sealed 26th December.

Margaret Henrietta Marshall, of Manchester, for a certain improved plastic composition, applicable to the fine arts, and to useful and ornamental purposes.—Sealed 5th January, 1844.

James Champion, of Salford, and Thomas Marsden, of Salford, machine-makers, for improvements in drawing, winding, and spinning cotton and other fibrous substances.—Sealed 9th January.

James Overend, of Liverpool, for improvements in printing fabrics with metallic matters, and in finishing silks and other fabrics, —being a foreign communication.—Sealed 9th January.

Charles Townsend Christian, of St. Martin's-place, St. Martin's-lane, London, East India Army Agent, for improvements in the construction of steam-engines,—being a foreign communication.—Sealed 12th January.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, London, civil engineer, for improvements in machinery or apparatus for facilitating the tracing or copying of designs, drawings, and etchings of all kinds, either of the original size, or upon an enlarged or reduced scale,—being a foreign communication.—Sealed 15th January.

William Nichol, lithographer and printer, in Edinburgh, for improvements in lithographic and other printing presses.—Sealed 18th January.

Charles Tayleur and James Frederick Dupré, of the Vulcan Foundry, Warrington, and Henry Dubs, also of the Vulcan Foundry, engineer, for certain improvements in boilers.—Sealed 18th January.

Alexander Bain, of No. 320, Oxford-street, London, mechanist, for improvements in producing and regulating electric currents, and improvements in electric time-pieces, and electric printing, and signal telegraphs.—Sealed 19th January.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, London, civil engineer, for certain improvements in machinery for preparing and combing wool, hair, and other fibrous substances,—being a foreign communication.—Sealed 19th January.

New Patents
SEALED IN ENGLAND.
1843-4.

To Richard Archibald Brooman, of Fleet-street, Gent., for certain improvements in figure-weaving machinery,—being a communication. Sealed 28th December—6 months for inrolment.

Thomas Murray Gladstone, of Swan Garden Iron-works, Wolverhampton, iron-master, for certain improvements in machines for cutting or shearing iron, or other metals, which improvements are applicable to other like purposes. Sealed 28th December—6 months for inrolment.

George Benjamin Thorneycroft, of Wolverhampton, iron-master, for a machine for rolling, squeezing, or compressing puddled balls of iron, and also for crushing or grinding other substances. Sealed 28th December —6 months for inrolment.

Robert Noyes Elven, of Southampton-street, Camberwell, shoemaker, for improvements in the manufacture of boots, shoes, galoshes, and clogs, which improvements are applicable to the manufacture of leather-hose and buckets. Sealed 28th December—6 months for inrolment.

Henry Lowcock, of Westerland, Devon, Gent., for improvements in ploughs. Sealed 28th December—6 months for inrolment.

Edward Budd, of the Hafod Copper-works, Glamorgan, copper-merchant, and William Morgan, of the same place, refiner of copper, for improvements in treating or reducing of copper ores, and in the construction of furnaces for treating such ores, part of which improvements are applicable to other ores. Sealed 28th December—6 months for inrolment.

George Gwynne, of Regent-street, Gent., and George Fergusson Wilson, of Belmont, Vauxhall, Gent., for improvements in the manufacture of candles, and in treating fatty and oily matters to obtain products for the manufacture of candles, and other uses. Sealed 28th December—6 months for inrolment.

James Champion, of Salford, machinist, and Thomas Marsden, of the same place, machine-maker, for improvements in drawing and spinning cotton and other fibrous substances. Sealed 28th December—6 months for inrolment.

Alexander Denoon, of Adam's-court, Broad-street, merchant, for improvements in the mode of making carbonate of soda. Sealed 1st January—6 months for inrolment.

Alexander Denoon, of Adam's-court, Broad-street, merchant, for improvements in the mode of making muriate of ammonia. Sealed 1st January—6 months for inrolment.

William Longmaid, of Plymouth, accountant, for an improvement in the manufacture of copper, tin, zinc, and peroxide of iron. Sealed 1st January—6 months for inrolment.

John Hinks, George Wells, and Joseph Finnemore, all of Birmingham, metallic pen-makers, for improvements in the manufacture of metallic pens, and in machines for manufacturing metallic pens. Sealed 4th January—6 months for inrolment.

William Wright, of Duke-street, St. James's, surgeon, for certain improvements in rendering leather, skins, or hides, impervious to wet, more flexible and more durable. Sealed 11th January—6 months for inrolment.

Laurence Hill, Jun., of Glasgow, civil engineer, for improvements in machinery for manufacturing shoes for horses and other animals,—being a communication. Sealed 11th January—6 months for inrolment.

William Hale, of Woolwich, engineer, for improvements in rockets. Sealed 11th January—6 months for inrolment.

Robert Foulerton, of the Jamaica Coffee-house, Cornhill, master mariner, for certain improved machinery for moving vessels and other floating apparatus. Sealed 13th January—6 months for inrolment.

Anthony Movillon de Glimes, of Panton-street, Haymarket, Gent., for certain improvements in apparatus for propelling vessels on water, and also in machinery capable of communicating manual power to work the same; which machinery is also applicable to raising heavy bodies, and exerting power for various other purposes. Sealed 13th January—6 months for inrolment.

Henry Bessemer, of Baxter House, St. Pancras, Esq., for a new pigment or paint, and the method of preparing the same, part of which method is also applicable to the preparing and treating of oils, turpentine, varnishes, and gold size, when employed to fix metallic powders and metal leaf, or as a means of protecting the same. Sealed 13th January—6 months for inrolment.

James Lindley, of Cranbourne-street, Middlesex, Gent., for improvements in coffins. Sealed 16th January—6 months for inrolment.

Thomas Aspinwall, of Bishopsgate Church-yard, Esq., for an improved cannon, formed either of wrought iron or steel, or wrought iron and steel combined; and also instruments and machinery used in making, and method of making, said cannon,—being a communication. Sealed 16th January—6 months for inrolment.

Charles Cameron, of Liverpool, chemist, for improvements in extinguishing fires in buildings. Sealed 16th January—6 months for inrolment.

Benjamin Cheverton, of Pratt-street, Camden Town, sculptor in ivory, for improvements in machinery for cutting wood and other materials. Sealed 16th January—6 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, Middlesex, civil engineer, for improvements in machinery or apparatus for facilitating the tracing and copying of designs, drawings, and etchings, of all kinds, either of the original size, or upon an enlarged or reduced scale,—being a communication. Sealed 16th January—6 months for inrolment.

William Watson, Jun., of Leeds, manufacturing chemist, for improvements in the manufacture of sulphate, muriate, and other salts of ammonia. Sealed 16th January—6 months for inrolment.

William Nichol, lithographer and printer in Edinburgh, for improvements in lithographic and other printing presses. Sealed 16th January—6 months for inrolment.

John Fielding Empson, of Birmingham, manufacturer, for certain improvements in the construction and manufacture of buttons and other fastenings for dress. Sealed 16th December—6 months for inrolment.

William Basford, of Burslem, Staffordshire, brick and tile manufacturer, for certain improvements in the mode of manufacturing bricks, tiles, quarries, and certain other articles made or composed of brick-earth, and of burning and firing the same; and certain articles of pottery and earthenware. Sealed 20th January—6 months for inrolment.

Claude François Jules Petit, of Regent-street, merchant, for improvements in fastenings for gloves,—being a communication. Sealed 23rd January—6 months for inrolment.

Samuel Wright, of Shelton, in the Staffordshire Potteries, for a manufacture of ornamental tiles, bricks, and quarries, for floor pavements, and other purposes; being an extension for the term of seven years, from the 26th instant, of former letters-patent, granted to the said Samuel Wright for the said invention. Sealed 23rd January.

Thomas Nash, of Paul's Cray, Kent, paper manufacturer, for certain improvements in machinery for the manufacture of paper. Sealed 23rd January—6 months for inrolment.

Henry Davies, of Norbury, Staffordshire, engineer, for certain improvements in the construction of vessels for conveying goods or passengers on water; also certain improved arrangements of machinery for communicating motion to such vessels. Sealed 25th January—6 months for inrolment.

CELESTIAL PHENOMENA FOR FEBRUARY, 1844.

D.	H.	M.	
1			Clock before the sun, 13m. 50s.
	—		☽ rises 1h. 53m. A.
	—		☽ passes mer. 10h. 8m. A.
	—		☽ sets 5h. 35m. M.
4	8	43	Ecliptic oppo. or ○ full moon
5			Clock before the sun, 14m. 16s.
	—		☽ rises 6h. 54m. A.
	—		☽ passes mer. 0h. 42m. M.
	—		☽ sets 7h. 33m. M.
	15	6	☿ in conj. with ♄ diff. of dec. 3. 37. N.
6			Occul *e* Leonis, im. 11h. 30m. em. 12h. 38m.
8			Occul 75 Virginius, im. 20h. 5m. em. 21h. 5m.
	17		☽ in Perigee
9	19		☿ stationery
	—		Occul Virginius, im. 12h. 12m. em. 13h. 11m.
10			Vesta in Perihelion
	—		Clock before the sun, 14m. 31s.
	—		☽ rises 0h. 18m. M.
	—		☽ passes mer. 4h. 57m. M.
	—		☽ sets 9h. 29m. M.
10	16		Juno in conj. with ♅ diff. of dec. 3. 42. S.
11	5	22	☽ in □ or last quarter
12			Occul *b* Ophiuchi, im. 17h. 5m. em. 18h. 16m.
14	8	26	♂ in the ascending node
15			Clock before the sun, 14m. 27s.
	—		☽ rises 5h. 29m. M.
	—		☽ passes mer. 9h. 45m. M.
	—		☽ sets 2h. 8m. A.
	3		Pallas in □ with the ☉
	19	49	☿ in conj. with the ☽ diff. of dec. 2. 2. S.
	20	28	♄ in conj. with the ☽ diff. of dec. 3. 42. S.
16	11	35	☿ in conj. with ♄ diff. of dec. 1. 30. N.
	17	46	♀ in conj. with ♅ diff. of dec. 0. 8. N.
18			Mercury R. A. 20h. 19m. dec. 18. 39. S.
	—		Venus R. A. 0h. 7m. dec. 0. 0.
	—		Mars R. A. 1h. 11m. dec. 7. 37. N.
	—		Vesta R. A. 18h. 19m. dec. 20. 18. S.
	—		Juno R. A. 0h. 16m. dec. 3. 3. S.
	—		Pallas R. A. 16h. 1m. dec. 6. 19 N.
	—		Ceres R. A. 16h. 3m. dec. 13. 8. S.
	—		Jupiter R. A. 22h. 38m. dec. 9, 37. S.
	—		Saturn R. A. 20h. 16m. dec. 20. 3. S.
	—		Georg. R. A. 0h. 2m. dec. 0. 28. S.
	—		Mercury passes mer. 22h. 28m.
	—		Venus passes mer. 2h. 17m.
	—		Mars passes mer. 3h. 21m.
	—		Jupiter passes mer. 0h. 48m.
	—		Saturn passes mer. 22h. 22m.
	—		Georg. passes mer. 2h. 12m.
	8	46	Ecliptic conj. or ● new moon
	17	45	♃ in conj. with the ☽ diff. of dec. 6. 7. S.
20			Clock before the sun, 14m. 5s.
	—		☽ rises 7h. 23m. M.
	—		☽ passes mer. 1h. 42m. A.
	—		☽ sets 8h. 15m. A.
	13	28	♅ in conj. with the ☽ diff. of dec. 6. 7. S.
	22	50	♀ in conj. with the ☽ diff. of dec. 5. 57. S.
21	1	30	Ceres in □ with the ☉
	11		♀ in conj. with Juno, diff. of dec. 4. 15. S.
22	7	7	♂ in conj. with the ☽ diff. of dec. 4. 23. S.
	22	49	☿ in the descending node'
23	5	18	☿ greatest elong. 26. 49. W.
24	1		☽ in Apogee
25			Occul *a*1 in Tauri, im. 11h. 43m. em. 11h. 50m.
25			Clock before the sun, 13m. 26s.
	—		☽ rises 9h. 17m. M.
	—		☽ passes mer. 5h. 26m. A.
	—		☽ sets 0h. 42m. A.
26	9	58	☽ in □ or first quarter
29	5	10	♃ in conj. with the ☉

The Satellites of Jupiter are not visible this Month, Jupiter being too near the Sun.

J. LEWTHWAITE, Rotherhithe.

THE
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CONJOINED SERIES.

No. CXLVII.

RECENT PATENTS.

To Luke Hebert, *of Birmingham, in the county of Warwick, for improvements in machinery for fulling woollen cloth,—being a communication.*—[Sealed 20th September, 1841.]

These improvements in fulling-machinery consist, Firstly,—in certain modifications of the form and manner of applying the cylinders for fulling cloth, in the direction of its breadth, with a view to avoid the inconveniences which arise when pairs of upper and lower cylinders are employed for that purpose. Secondly,—in certain arrangements to ensure the parallelism of the axes of the pressing-rollers. Thirdly,—in the form and construction of the trough, in which the cloth is fulled, in the direction of its length. Fourthly,—in arrangements for combining fulling by pressure, with fulling by percussion. Fifthly,—in the substitution of other materials for wood or metal, in the construction of certain parts of the machinery.

The drawings, in Plate IV., exhibit the improved machinery for fulling cloth by pressure. Fig. 1, is a side elevation of the machine; fig. 2, a longitudinal section of the same; fig. 3, an oblique section of a portion of fig. 2, with some modifications; and fig. 4, a vertical section of the same part, to give another view of the modification. A, is the great cylinder, formed of wood or copper, and mounted upon a shaft B, which turns in plummer-blocks, supported by the frame-work. Upon this shaft is fixed a wheel D, which is driven by a pinion E, fixed on the driving-shaft of the machine. Affixed to the sides of the cylinder A, are copper flanges, which, with the periphery of the cylinder, form a deep groove or channel; and into this channel the cloth is received and conducted under three small cylinders C, C, C^1, in succession; which, by their pressure, effect the fulling of the cloth laterally. The shafts of these cylinders turn in bearings a^1, on either side of the machine; the bearings are formed in racks *a*, the lower end of which slide in guides, fixed upon the outside of the casing. *b*, *b*, are toothed sectors, gearing with the racks *a*, *a*; and b^1, are levers, fixed to their respective axes, and fitted with moveable weights, for the purpose of regulating the pressure of the small cylinders upon the large one.

In order to sustain and guide the upper ends of the racks *a*, *a*, small grooved rollers are furnished, as shewn at fig. 1. Upon the shaft of the cylinder C^1, is fixed a small wheel *c*, which is driven by the wheel D, and thus insures the motion of the cylinder C^1, in its action upon the cloth, which, at this part, experiences a greater resistance, owing to the effect of the fulling longitudinally. *d*, is a shoe-piece, so formed that the cloth cannot get between it and the cylinder; its upper end (shewn by dots in fig. 2,) detaches the cloth from the surface of the large cylinder, and throws it into the trough, in which it is fulled longitudinally. *e*, is an upper shoe, which serves the same purpose with regard to the cylinder C^1, as the lower shoe with respect to the cylinder A; this shoe *e*, is, by means of a cross-piece, attached to arms *e**, fitted with plummer-blocks, which turn upon the shaft of the cylinder C^1, and thus connect the cylinder with the shoe, in such a manner that whatever motion the cylinder may receive, the shoe will still remain in contact with it. The form and action of these shoes may be best understood by reference to fig. 4, which exhibits a modification of the expanding trough or channel. F, fig. 2, is one of two grooved plates or boards, forming the sides of the expanding trough; these plates are attached to the cheek-pieces *f*, which turn upon pivots in the arms *g*, of the bell-crank levers G; and the inner end *f**, of the side-plates is retained by iron rods *x*, fig. 3, attached by a screw to the side of the machine. To the arms *g*, of the bell-crank levers G, are fastened the bars *h*, to which the weighted cord, passing over a pulley, is attached; and which, acting upon the bell-crank levers, tends to close the sides of the expanding trough, and thus compresses the cloth in the trough with a force proportioned to the weight attached to the cord. K, is a board, having a slot *l*, in it, through which the cloth, coming from the cistern or lower part of the machine, is drawn, and is thereby gathered up. From thence the cloth passes through the rectangular tube L, which enables it to enter the trough or channel in the large cylinder A, more readily. The longitudinal aperture of the tube L, being placed so that its width shall cross the breadth of the slot *l*, in the board K, the cloth *i*, in its passage from K, to L, is pressed in different directions, and the disposition of its folds is thereby changed at each revolution. V, is a roller, which supports the cloth, at the proper angle, in its passage from K, to L.

In figs. 3. and 4, is shewn a different mode of constructing the sides of the expanding trough, in lieu of the grooved planks F; the sides are composed of two cast-iron plates H, H, in each of which is inserted a row of small grooved vertical cylinders J; these cylinders are so arranged that the projection of the cylinders in one row faces the recess formed by the contact of two cylinders in the opposite row.

Figs. 5, 6, 7, and 8, represent various modifications of apparatus for fulling cloths by percussion. In all these figures the cloth is delivered by the rollers N, N, into a trough O, whence it passes to a table R, where it is submitted to the action of the beaters P. The cylinders N, N, may be considered as substitutes for the large cylinder A, and the small cylinders C, C, in the machine above described; they may be made much wider, and without flanges; their use may likewise be limited to simply drawing forward the cloth. The lower cylinder is driven in the same manner as the cylinder A. The bottom of the trough O, is fixed, but the top is hinged, and is kept down by a weight attached thereto, as in figs. 5, 7, and 8, or by a spring, as in fig. 6; thus opposing the free exit of the cloth from between the cylinders N, N, whereby the cloth is fulled lengthwise. The beaters P, may be made of various forms, and put in motion by various means; thus, in figs. 5, and 6, the beaters are of a cylindrical form, and each has a motion around its own axis in addition to its motion around the common centre *p*. In fig. 7, a mallet P, is set in motion by a cam *p*; and in fig. 8, the mallet P, is moved by an excentric or crank *p*; the force of the blow may be regulated by suspending the table R, from a hinge, and giving it an upward pressure by a weight, as shewn in the figures 5, 6, and 8: or the table may be a fixture, and the force of the blow regulated by weights, placed upon the beater, as in fig. 7.

In fig. 9, is shewn another arrangement for fulling the cloth in the direction of its breadth. A portion *s*, *s*, of the top and bottom of the trough turns upon hinge-joints, forming clap-boards, and is connected to the rods *t*, *t*; by the motion of which rods, the pieces *s*, *s*, are made alternately to recede from and to approach each other violently; effecting by the shock a part of the fulling breadthwise, as is done by the cylinders before described. Fulling longitudinally is effected in this expanding channel as in the others. With a view to avoid, on the one hand, the evils caused by rust or oxidation when metal is employed in the construction of some parts of the machine, or, on the other hand, those caused by alternate expansion and contraction when wood is so employed, the patentee prefers constructing portions of the machinery (more especially the troughs and cylinders) of stone, or such earthy materials as are susceptible of polish, such as granite, marble, glass, porcelain, or earthenware.

The operation of the machinery is as follows:—The cloth is first passed through the fixed channels, next between the cylinders, and then through the expanding trough; after which the two ends are sewed together. Upon setting the machine in motion, the cloth, lying in the cistern or bottom of the apparatus, is gathered up by the first fixed channel; whence, passing over the guide-roller, it enters the second fixed channel, the aperture of which, as before explained, is placed in a different position from that in the first, whereby not only is the cloth arranged, so as to place itself, with more facility, between the rollers, but at each time that the same portion of cloth, in its successive revolutions, passes through these channels, the position of its folds becomes changed. From the second fixed channel the cloth passes into the channel or groove of the large cylinder, which, in its revolution, draws forward the cloth, which, passing between the large cylinder and the smaller ones placed over it, is fulled in the direction of its breadth, more or less, according to the pressure thrown upon the small cylinders by the weighted levers.

The third or last of the small cylinders (which, as before explained, is driven by a toothed wheel, in order to insure its action), accumulates the cloth, in the expansive trough, until the increase causes the two sides to recede slightly, and thus partially, and at intervals, to allow the cloth to pass through. In its passage through the expanding trough the cloth, heaped up and folded back upon itself, becomes fulled lengthwise. In the case of the sides of the expanding trough being formed of small cylinders, as shewn in figs. 3, and 4, in lieu of the grooved plates, shewn in the first arrangement, the fulling is more rapidly and thoroughly effected, as, instead of one continued squeeze, each cylinder in succession, from their being placed in "quincunx," gives the cloth a squeeze.

In fulling by percussion, jointly with pressure, the beaters, contrary to the action of the common beaters, full the cloth, in successive portions, as it comes under their action, the force of which can also be regulated, either by weights placed upon the beaters, or by the degree of resistance given to the tables, according to the mode of construction employed.

Lastly, in fulling by the cylinders and clap-boards, the fulling, in each direction, is effected by successive violent approaches of the clap-boards, and the heaping and doubling up of the cloth between them, by the action of the cylinders.

The patentee claims, First,—the general construction and combination of the parts in the several arrangements hereinbefore described. Secondly,—for the purpose of fulling cloth in the direction of its breadth, the employment of a cylinder, having a channel or groove formed in its periphery, into which the cloth is received, and in which it is subjected to the pressure of any number of cylinders or rollers. Thirdly, —the employment of racks and pinions, to preserve the parallelism of the pressing-rollers of fulling machinery. Fourthly,—for the purpose of fulling cloth in the direction of its length, the employment of a trough, the sides of which are moveable in a lateral direction; he also claims the giving to the top and bottom of the trough, in which the cloth is fulled in the direction of its length, the form shewn in figs. 2, and 4, for the purpose of more readily detaching the cloth from the cylinders, whether the sides of such trough be moveable or not. Fifthly,—the fulling of cloth by the effect of pressure and percussion conjointly, by any of the methods hereinbefore described. Sixthly,—the constructing of such of the moving parts of the machine, as the cloth comes in contact with, of stone, glass, earthenware, or such similar substances as are not liable to corrode, are susceptible of polish, and are insoluble in water.—[*Inrolled in the Inrolment Office, March*, 1842.]

To William Edward Newton, *of the Office for Patents*, 66, *Chancery-lane, in the county of Middlesex, civil engineer, for an invention of certain improvements in the construction and arrangement of axles and axletrees for carriages, carts, and other vehicles used on rail or other roads,—being a communication.*—[Sealed 8th December, 1842.]

This invention, which was communicated to the patentee by a foreigner residing abroad, consists in certain improvements applicable to the axletrees of carriages, whereby the friction is considerably reduced, and the carriage enabled to run much easier upon the road, and with a lighter draft to the horses.

The figures in Plate V., represent different views of the improvements. Fig. 1, is a side elevation of the apparatus, taken from the inner or carriage side of the wheel; fig. 2, a section, taken vertically in the line C, D, of fig. 3, which is another sectional view, taken in the line A, B, of fig. 1.

In these improvements two metal rollers G, G, of the same or different diameters, and the wrought-iron axles of which are placed horizontally, or slightly inclined, rest (at the lower opening that is made between them) upon the turned part H, of the axletree, which is greater in diameter than the part I, of the axletree. These rollers are made of such a length or breadth that they will not oscillate or rock. The axles of the rollers are supported against brass or bronze bearings J, J, fig. 1, formed in the part K, fig. 3, of a cast-iron box L, fixed by means of four bolts O, O, (or in any other manner,) to the under side of the shaft E, which, at this part, is made of a suitable substance and strength, either by forming it from one single piece, or by adding two cheeks P, P, and fastening them by means of transverse bolts, as seen in fig. 3. Another bearing Q, partially surrounds, at its under side, (but without any sensible friction,) the turned part H, of the axletree, and is supported by a bridle-piece R, R, which is bolted to the under part of the cast-iron box L, L. This arrangement is adopted in order to keep the axletree in its proper place, under the rollers G, G, and prevent it from being disturbed by shocks or other causes, which might tend to disarrange it. If thought necessary, the bridle-piece may be made less curved and stronger than it is represented to be in the drawing, and the bearing Q, may be made hollow, so as to answer the purpose of a grease-box, (in the manner they are employed upon railways,) by means of a small cylinder of cork or deal, floating upon some oil, which is poured into the said hollow. The bearing is, however, maintained in contact with the axletree, which, as well as the two rollers, are, by this means, kept properly lubricated.

The whole of the apparatus is covered or surrounded with a box or case of thin sheet-iron, as shewn by the dotted lines in the elevation, fig. 1. This box or case is shewn in elevation at fig. 4. It is attached or fastened to the shaft, or to the cast-iron box L, by screws, and serves as a protection from mud and dust; and also as a reservoir for an oil-bath, in case the hollow bearing Q, above mentioned, is not employed as a grease-box.

Another sheet-iron covering V, is also used for a similar purpose, and protects the nave of the wheel. It is also attached to the shaft by wood screws. Two little channels S, S, either connected to or formed on the cast-iron casing, and covered with a small piece of leather, or closed by means of a plug, are placed on each side of the apparatus, in such a manner as to allow the axles of the rollers to be lubricated without removing the sheet-iron box or case. The two little bars T, T, are for the purpose of supporting the two rollers in their proper places, if from any cause whatever it should be found necessary to remove the axletree, for a short time, from the rest of the apparatus. The wheels of the carriage are moveable round the axletree when the carriage is employed for common roads, but fixed when used on railways.

These improvements are stated to present the following advantages:—1st. A very great diminution of the friction, and from that, of course, lighter draft, as has been proved by experience. 2nd. By this reduction of friction the proportions of the axle F, F, (fig. 3,) may be increased; whereas, if fixed or revolving axletrees were mounted in ordinary bearings, their proportions could not exceed certain limits, without an increase of the diameter of the axle, which necessarily causes a proportional increase of resistance from friction. By this reduction of friction, the chances of rupture or breakage are evidently diminished. 3rd. Another cause of the diminution of the chances of breaking, is the impossibility of the axles getting overheated, as the transforming of the rubbing friction of ordinary axles into a rolling motion will never allow them to get heated to such a point as to give them a tendency to either break or twist. 4th. The impossibility of the oil becoming a thick, viscous, and sticky grease, as the axle can never, as above mentioned, become so heated as to act upon it, and thereby render it, in a short time, useless.

5th. A regular and very slight wear of the axletree, which cannot be attained with the ordinary fixed axletrees, where the rubbing friction acts only on the under part, which thereby becomes worn away before the other part. 6th. By the axletree revolving with the wheel it will not be found necessary generally to allow the axle any play in the box, which is generally done to allow of the introduction of hog's lard or other substance, and which play greatly increases the wear of the box and axle. The sudden and frequent shocks and oscillations of the wheel, to which ordinary vehicles are subject, and which act very disadvantageously on them, are hereby prevented. 7th. Upon level roads, by means of this system of rollers, a superabundance of power is obtained, a portion of which may be usefully employed for ascending inclines. It will be sufficient for this to diminish the height of the wheels, which, as is well known, always throw back the centre of gravity of the load behind the point of support upon the ground, according as their diameter is greater or less, and thereby require a greater power of traction.

These improvements may be applied to all descriptions of vehicles, so as to allow of an increase of load, or to admit of a decrease in the amount of power required to move the same.

The patentee claims the employment or application of rollers to the axles or axletrees of carriages, in the manner and for the purposes above described.—[*Inrolled in the Rolls Chapel Office, June*, 1843.]

To ALFRED BREWER, *of Surrey-place, in the county of Surrey, wire weaver and felt manufacturer, for improvements in machinery for manufacturing paper,—being a communication.*—[Sealed 11th February, 1843.]

THIS invention may be divided into three parts :—The first relates to machinery for supplying pulp to the working vats of paper machines, or to the vats where paper is made by manual labour; the second relates to machinery for supplying water to those vats, for the purpose of diluting the pulp;

and the third part to apparatus for arresting the pulp contained in the waste water, resulting from the various processes which the rags, &c., undergo, in their being manufactured into paper.

The apparatus for supplying pulp to the paper-machine is termed the pulp-meter or regulator, and is represented, in section, at fig. 1, in Plate IV. It consists of a cylinder *a*, connected by a pipe *b*, with the pulp-chest *c*, and containing a curved piston *d*; the hollow piston-rod *e*, has a screw formed upon it, fitting into a corresponding female screw in the top *f*, of the cylinder; this top is retained in its place by the ring *g*, screwed to the cylinder, but can be turned round by the handles *h*, in order to raise or lower the piston, which is prevented from turning by a small pin, projecting from it into a vertical groove a^1, in the side of the cylinder; *i*, *j*, are two rotary valves, worked by gearing from the driving shaft of the paper machine; and *k*, is a pipe to carry off the air which enters the apparatus.

The action of the apparatus is as follows, supposing the valves *i*, *j*, to be closed at the commencement of the operation:—The valve *i*, is first opened, and the pulp passes from the pipe *b*, into the space beneath the piston *d*; the valve *i*, is then closed, as shewn by the dotted lines at i^1, and the valve *j*, being opened, (as represented by the dotted lines at j^1,) the pulp descends into the working vat: the valve *j*, is then closed, and the operation proceeds as before. The amount of pulp discharged from the meter, each time the valve *j*, is opened, may be increased or lessened by raising or lowering the piston; and as the speed of the paper-machine varies, and, consequently, the amount of paper made in a given time, the quantity of pulp supplied through the meter in the same time will also vary, by reason of the connection of the valves *i*, and *j*, with the driving-shaft of the paper-machine, and the paper will always be of a uniform thickness. Instead of the valves *i*, *j*, cylindrical plugs, with an opening through them, may be used.

When the meter is used for supplying pulp to the vats where paper is made by hand, in moulds, the rate at which it is driven is regulated according to the speed of the workman.

The machine for supplying the water employed for diluting the pulp in the working vat (which, as delivered from the pulp-chest, is too thick for ordinary use) is similar, in every respect, to the meter above described; and the advantages to be attained by its use are, that the water will be supplied uniformly from time to time, and in relative proportionate quantities to the pulp.

The patentee claims, under the first and second parts of this invention, the general combination and arrangement of parts constituting a meter or machine for supplying pulp or water, in the manufacture of paper; motion being communicated to the valves or pierced plugs of such meter from the driving-shaft of the paper-machine, and regulated according to the rate at which the paper is made, as above described.

A cylinder, covered with fine wire-gauze, or an endless wire-cloth, carried by rollers, is employed for arresting the pulp contained in the waste water of paper-mills. Fig. 2, represents, in section, the wire-gauze cylinder, mounted for this purpose. *a*, is the cylinder, which is preferred to be about sixteen inches in diameter, and eighteen inches wide; a number of metal or other rods extend from end to end, and over these a strong wire is wound, in a spiral direction; the wire is then covered with coarse wire-gauze, the meshes of which are about fourteen to the inch, and this is covered with fine wire-gauze, of from seventy-five to eighty meshes in the inch. The interior of the cylinder is furnished with scoops *b*, which are firmly secured thereto, and revolve around a fixed tube *c*, employed for carrying off the clear water that passes through the periphery of the cylinder. *d*, is a rectangular vessel, divided into two compartments by the partition *e*; the waste water is admitted into the first compartment through the pipe *f*, and the cylinder *a*, revolving therein, collects the pulp upon its periphery of wire-gauze, from whence it is removed by the gathering-roller *g*, covered with felt; the water that passes through the wire-gauze is carried up by the scoops *b*, and discharged through the opening *h*, into the tube *c*. The roller *g*, is kept in contact with the cylinder *a*, by springs; and when the pulp has accumulated upon it, to the thickness of half an inch, its weight will cause it to become detached from the roller, and fall into the second compartment of the vessel *d*.

The cylinder *a*, may be used without the scoops *b*, and tube *c*; the clear water, in that case, passing away through a tube, which is inserted into one end of the cylinder, and acts as the axis of that end; or the waste water may descend upon the cylinder from a spout, and the clear water pass away through the pipe *f*.

The mode of using the endless wire-cloth is shewn in the section, fig. 3. *i*, is the endless cloth, carried by the two rollers *j*, *j*, which revolve in the first compartment of the vessel *d*; the waste water is delivered upon the endless wire-cloth by the spout *k*, and the pulp is removed therefrom by the roller *g*; the clear water is carried away by the pipe *f*. To prevent the pulp from overflowing, deckel leathers *l*, are fastened to the extreme edges of the wire-cloth.

With regard to the last part of this invention, the patentee claims the construction and application of the combined apparatus of the revolving surface of wire-web and gathering-roller, for the purpose of collecting and saving the pulp hitherto wasted in the manufacture of paper.—[*Inrolled in the Inrolment Office, August,* 1843.]

To WILLIAM MIDWORTH, *of Mansfield, in the county of Nottingham, brass-founder, for certain improvements in the construction of what are commonly called street guard-plates, for public water-services, and in the mode of constructing the stop-valves, stoppers, or stop-cocks, used therein; and which stop-valves, stoppers, or stop-cocks, are also applicable to various other purposes, where the flow of water, or other liquids, is required to be regulated or suspended.* [Sealed 13th July, 1843.]

THIS invention consists, Firstly,—in a new construction of street guard-plate, to be substituted for the common street guard-plates, which are used for protecting or guarding the terminations of water service-pipes, or branches of such pipes, and the stop-cocks thereof, at places where the terminations of those pipes rise above the ground, against walls or posts. The common guard-plates are concave shells, or hollowed plates of cast-iron, which are fastened against the walls or posts, and enclose the terminations of the water-pipes, and part of their stop-cocks; but the improved guard-plates have a passage formed through them, which serves as a continuation of the service-pipe; and the upper part of the guard-plate is furnished with a stop-cock, thereby dispensing with that portion of the service-pipe which ascended above the ground, and the stop-cock belonging thereto.

The second part of the invention consists in an improved description of stop-cock, stopper, or stop-valve, to be used with the new guard-plates, and which may be also applied to other uses.

In Plate IV., fig. 1, is a front view; fig. 2, a vertical section of an improved guard-plate; and fig. 3, a perspective view of the parts composing the stop-cock. *a*, is the guard-plate, made in the form of a semi-circular column, projecting from the flat back *b*, which is secured to the wall or post by nails or spikes, inserted in the hole *c*. The lower part of the guard-plate is connected with the service-pipe or branch, by a union screw-joint *d*; and in the upper part is a chamber *e*, furnished with a spout *f*, and containing the stop-cock or valve for regulating the flow of water from the service-pipe and passage *g*, of the guard-plate into the chamber *e*, and thence through the spout *f*. The stop-cock consists of a hollow screw-plug *h*, with two or more lateral openings in it, working in a screwed socket *i*, in the lower part of the chamber *e*; the screw-plug *h*, has a projecting flange *j*, around it, faced with leather, which is pressed closely against the upper surface of the socket *i*, when the plug is screwed downwards, to make a water-tight joint. The cylindrical spindle *k*, of the plug, extends upwards through a stuffing-box in the cover *l*, of the chamber *e*, and terminates in a square end; upon this a key *m*, fits, by which the plug is turned, for the purpose of shutting off or discharging the water.

The end of the spindle *k*, may be made of any other shape, with a key to correspond; and the screw-plug and spindle may be placed in a horizontal instead of a vertical position, if preferred.—[*Inrolled in the Rolls Chapel Office, January,* 1844.]

To Daniel Williams, *of Oxford, slater, for certain improvements in covering ridges and hips of the roofs of buildings.*—[Sealed 13th June, 1842.]

This invention relates to a mode of covering the ridges and hips of roofs with slate, and the manner in which it is effected will be seen by reference to the drawings, in Plate V., where fig. 1, represents an end view of a block of slate, which the patentee divides into four parts in the following manner:—Two inclined saw cuts are made from *a*, to *b*, and two other saw cuts from *c*, to *d*; then, by means of a splitting chisel, the block of slate is caused to split in the lines *e*, *f*, *g*, which will produce the four parts A, B, and A, B; and the large ends of those parts B, B, for covering the ridges or hips of a roof, are shaped off in the manner shewn by dots at B^1; but such rounding or shaping is not absolutely necessary; the size of the slates A, B, and A, B, may be varied, and the inclined cuts *a*, *b*, *a*, *b*, should correspond with the angular inclination of the roof. The parts A, B, combine together in forming a portion of the covering of a ridge or hip of a roof, the part A, coming under the part B, at B^1, as is shewn.

Fig. 2, shews a side view of part of the covering of a ridge or hip of a roof where the parts B, overlap each other in forming a joint, they being cut away for that purpose, as is shewn, and in like manner the parts A, overlap; but such overlapping of the parts A, B, may be dispensed with, and only butt joints used, as shewn at fig. 3. In both cases, however, the patentee prefers that pins *h*, *h*, should be used, as shewn, which enter into holes drilled in the end of the parts B^1. Fig. 4, shews an end view of the two parts A, B, in the position they are fixed with respect to each other, when on a ridge or hip of a roof. Fig. 5, represents the parts A, when a butt joint is used; and fig. 6, the same parts when a lap joint is used. Fig. 7, represents, in section, part of a roof, with its ridge covered by slates, formed as above described; the parts A, are affixed to the ridge by nails or screws, then the part B, at the parts B^1, overlaps the upper edge of the part A, in this manner making a good joint, and the parts B, are affixed to the roof by nails or screws.

The patentee remarks, that although he has described a particular manner of cutting a block of slate, so as to produce the parts A, and B, with the least waste, yet he does not confine himself thereto; his invention consisting of forming slates into the forms A, and B, whereby the part B, may cover the ridge or hip of a roof, as above described.—[*Inrolled in the Inrolment Office, December,* 1842.]

To JOSEPH DREW, *the younger, of Saint Peter's Port, in the Island of Guernsey, confectioner, for his invention of an improved method of rolling and cutting lozenges, and also of cutting gun-wads, wafers, and other similar substances, by means of a certain machine designed by him, and constructed of divers metals and wood.*—[Sealed 6th September, 1841.]

THIS invention consists in the adaptation of certain machinery to the purposes above mentioned, viz., the formation of lozenges and other similarly shaped things, as wafers, gun-wads, and some other articles of the like forms.

In Plate V., fig. 1, is a sectional elevation, taken longitudinally through about the middle of the machine, and fig. 2, is a horizontal view of the same, as it would appear from above. Upon a suitable frame and standards is placed an inclined plane *a, a, a,* which is preferred to be of plate brass, for the purpose of receiving and conducting the plastic material of which the lozenges are to be formed, whilst that material is undergoing the operation of being rolled into a flat sheet. Three, or it may be more, pairs of rollers *b, b, c, c,* and *d, d,* intercept this inclined plane, between which several pairs of rollers the plastic material is intended to pass, and by which it is spread out flat, and formed into a sheet of any required thickness.

When the material to be operated upon is of a tough nature, a pair of fluted rollers may be used with advantage, to form a more compact amalgamation, previous to its passing through the other rollers, in which case they are to be placed at the upper part of the inclined plane, before the other rollers. These rollers *b, b, c, c,* and *d, d,* are severally coupled together by corresponding toothed pinions *b**, *c**, and *d**, fixed on the ends of their axles, as seen in fig. 2, by which they are made to turn simultaneously in opposite directions. At the reverse ends of the axles of the lower rollers *b, c,* and *d,* bevil pinions are affixed, which severally take into similar bevil pinions, on a lateral shaft *e, e,* mounted in bracket bearings at the side of the frame. On the outer end of the lower roller *b,* a fly-wheel *f,* is affixed, and also a winch or handle, or it might be a pulley, with a strap, by means of which this part of the machinery is to be actuated.

The method of working the improved apparatus is as follows:—A suitable quantity of the material, properly mixed for making lozenges of any required kind, is to be weighed out (say a sufficient weight to cover, when rolled, the whole of the cutters). That quantity of material is to be placed in a lump at the upper part of the inclined plane *a.*

Rotary motion being then given to the rollers, through the winch and wheel, or pulley *f,* the plastic material will be drawn through between the first pair of rollers *b, b,* and in so passing will be spread out and regulated in its thickness. Sliding down the inclined plane *a,* the material will then, in like manner, pass between the second pair of rollers *c, c,* by which it will be further spread out, and rendered into a thinner sheet; and sliding onward upon the inclined plane *a,* it will lastly proceed between the third pair of rollers *d, d,* by which it will be spread out to its ultimate required thickness, and extended dimensions, into a sheet capable of being pierced or cut into the required number of lozenges, or other articles, by an apparatus about to be described. It may, however, be necessary to guard against the material (which will generally be of a sticky nature,) adhering to the surfaces of the rollers. For this purpose each roller is furnished with a scraper, attached to a weighted lever *g, g,* and *h, h,* by which the scrapers are made to act against the periphery of the rollers, and the sheet of plastic material is thereby enabled to slide freely down to the bottom of the inclined plane, where it is received on the upper surfaces of the cutters and table, or on to a board or plate, and afterwards put on to the cutters.

The cutting apparatus is shewn detached, in a horizontal view, at fig. 3, and in transverse elevation at fig. 4, looking toward the left of the preceding figures. It consists of a series of circular tubes *i, i, i,* inserted into a horizontal plate or table *k, k.* These tubes, *i,* are made in the forms of frustums of cones, having sharp cutting edges at their upper ends, as shewn in the detached view and section, drawn on an enlarged scale, at fig. 5. They are not, however, necessarily circular, but may be of any other shape suited to the form of lozenge or other article required to be cut out of a sheet of material placed upon their upper edges.

The table *k,* with its cutters *i, i,* is mounted on a frame or carriage *l, l,* which is made to slide upon the upper edges of two horizontal bars *m, m,* forming parts of the standards of the cutting apparatus. A horizontal rack bar *n,* is attached by a joint to the frame *l,* and by means of a winch and pinion *p,* taking into the rack *n,* the carriage, with the table and cutters, is moved to and fro upon the horizontal bars.

Before explaining the manner of cutting the lozenges, it will be necessary to describe more particularly the construction of the cutting apparatus, and its appendages, which in some respects resemble parts of a printing machine. At the side of the table there is, connected by hinge joints, a plate *q,* seen thrown back in figs. 3, and 4, which is perforated with holes corresponding to the positions of the circular cutters fixed in the table, and may be called a frisket. The plate *q,* when folded down upon the table, lies flat, the cutters *i, i,* protruding through it, as seen in fig. 1, and over this the sheet of material to be cut into lozenges is placed. A tympan frame, *r,* having a leathern back, also connected to the table by hinge joints, folds down upon the sheet of material, the leather covering the material, and keeping it from shifting, as the carriage and its appendages move along the horizontal bars.

The plastic material spread out upon the lower part of the inclined plane *a*, slides down the plane, as at *z*, in figs 1, and 2, and comes on to the top of the frisket plate *q*, and cutters *i*, *i*, the carriage being moved forward at the same time, in order that the sheet of material may be extended smoothly over the top edges of the cutting tubes. The tympan *r*, is then folded down upon the sheet of material, and the carriage moved onward by means of the pinion and rack.

In the progress of the carriage, the table with the material is passed under a heavy pressing roller *s*, which is suspended by its pivots, or the ends of its axle, turning in standards *t*, *t*, affixed to the horizontal bars *m*, *m*. The weight of this roller, as the table passes under it, presses the plastic material into the orifices of the cutting tubes *i*, *i*, by which the discs or lozenges are pierced out of the sheet, and, falling through the tubes, deposit themselves upon a board *u*, below, slidden into the carriage, under the table; and when the lozenges have been so deposited, the board containing them is removed.

The weighted roller *s*, is now to be raised by slightly depressing the balance-lever *v*, and weight *w*, and the carriage is brought back toward the inclined plane of the roller frame, by turning the pinion *p*, which acts upon the rack bar *n*, as before said.

As soon as the carriage has repassed the pressing roller, the tympan *r*, is to be raised, and then the frisket plate *q*, thrown back; by which the surplus material, or portion of the sheet not cut into lozenges, will be removed from the cutters and table, and let fall into a refuse vessel, to be afterwards worked up into lozenges, as before described.

In order to prevent any of the material adhering to the tubes or circular cutters *i*, *i*, a series of brushes *x*, *x*, are passed upwards through the tubes, which is done by raising a pendant jointed lever *y*, seen in fig. 4, connected to the frame that the stems of the brushes are fixed in, as shewn at fig. 1.

The frisket plate *q*, is then laid down flat upon the table *k*, and a board *u*, introduced beneath, as before, and the carriage passed into the situation shewn in figs. 1, and 2, ready to receive a fresh sheet of the material from the inclined plane *a*, of the rolling and spreading apparatus; and another operation of spreading and cutting is performed, as before described.

A modification of a part of this invention, designed to punch discs or other forms of lozenges from a sheet or thin cake of the lozenge material, is shewn at figs. 6, 7, and 8, which may in some cases be employed, instead of the apparatus for cutting discs or other forms by means of tubular cutters passed under a roller, as above described. Fig. 6, is a front elevation of this modified apparatus; fig. 7, a side elevation; and fig. 8, a longitudinal section of the same, taken in the direction of the last figure near the middle of fig. 6. An inclined plane A, A, may form a continuation of the plane *a*, in fig. 1, or constitute a portion of a distinct machine; D, D, correspond to the last pair of rollers *d, d*, in the former figures. The cake of material *z*, having passed between the rollers D, D, slides down the plane A, and then passes between the feeding rollers E, E, which carry it forward over a perforated plate F; and when the shee thas been so brought over the holes of the plate, a series of punches G, G, are made to descend and punch such portions of the sheet or thin cake through the plate, as are to constitute the lozenges. These punches G, are fixed into a horizontal bar H, which slides up and down between lateral guides I, I, and the punches, in their ascent and descent, are guided by passing through circular apertures in a stationary bar K, and the plate L.

The punches G, and bar H, are supported by weighted cords M, M, attached to the bar H, and passed over pulleys, as seen in fig. 6, which hold up the punches in the positions shewn; but when the sheet or cake *z*, has been brought on to the plate F, the punches are depressed, by turning the axle of the spur-wheel N; which spur-wheel, acting upon a tooth in the back of a guide bar O, rising from the horizontal bar H, depresses that bar, and forces the punches G, through the sheet or cake of material, and through the perforated plate F; by which means, discs or other formed lozenges are punched out of the sheet or cake, and deposited upon a receiving-board P, placed upon a ledge below; the punches being immediately raised to their quiescent position by the weighted cords M.

Supposing rotary motion to have been given to the lower roller D, by the means before described, or by any other contrivance, a pulley Q, on the shaft of that roller, may carry an endless band to a pulley R, on the shaft of the spur-wheel N, and thereby communicate the rotary motion simultaneously. This shaft has also a tappet-wheel s, at its outer end, (seen in fig. 7,) which, as it revolves, acts against a stud or roller in the lever T, and lifts that lever after every operation of the punches G, at the same time causing a rod U, to raise the arm V, to which a spring click is connected, taking into the teeth of a ratchet-wheel W, on the axle of the lower feeding-roller E. By these or any other convenient means the shaft of the spur-wheel N, and tappet-wheel s, being made to revolve, after every operation of the punches, a fresh supply of the sheet or cake of material is brought forward on the plate F, ready to be pierced, as described.

When the material to be cut does not require so much pressure, the weights may be dispensed with, and, by crossing the band, the motion of the wheel will be reversed, and, by that means, the punches will be raised, instead of depressed, and their own weight, in falling, will be sufficient to cut the material.

Having explained the construction and mode of working the improved machine, for rolling and cutting or punching lozenges, the patentee remarks, that this machine is also applicable to the rolling and cutting of biscuits, the size of the cutter being varied according to the article required to be produced; and the cutting portions of the machine are also applicable to cutting wafers, by placing the sheets of wafer upon the frisket-plate, over the cutters and table, and passing the carriage under the pressing-roller, as in cutting lozenges; and sheets of materials, such as paper, card, or felt, and other substances, may, by the same means, be cut into discs and other forms, for gun-wads, tops and bottoms of pill-boxes, and various other uses.—[*Inrolled in the Petty Bag Office, March,* 1842.]

Specification drawn by Messrs. Newton and Son.

To Adderley Willcocks Sleigh, K.T.S., *of Manchester, in the county of Lancaster, Captain in Her Most Faithful Majesty's Service, for his invention of a certain method or certain methods of effecting and forming sheltered floating harbours of safety, by the employment of certain buoyant sea barriers, applicable thereto; and which said improvements are also applicable to, and useful for the formation of breakwaters, floating bridges, light-houses, and beacons, the protection of pier-heads, embankments, and for other similar purposes.*—[Sealed 8th February, 1842.]

This invention consists in the construction and adaptation of sloping or oblique platforms, mounted upon, connected to, or supported by floating hollow vessels or caissons, by which the platforms are always maintained in the sloping or oblique positions, and are enabled to rise and fall with the tide. These floating vessels and sloping platforms, when constructed, are to be so arranged, as to form sea and wind barriers, for sheltering ships and other vessels, and also pier-heads, bridges, and other structures, requiring such shelter from the ordinary destructive effects of heavy seas and gales of wind.

In Plate VI., fig. 1, represents a transverse section of one of the floating breakwaters. *a, b, c,* is a hollow vessel, constructed of ribs of timber, strongly planked on the outside, and made perfectly water-tight and buoyant; but it may be made of sheet-iron, or other suitable material, if desired. This caisson is of a peculiar shape, being of the form of an oblong longitudinal wedge. The back part *b, b,* is rounded like the side of a vessel; the bottom *c, c,* is made perfectly flat; whilst the upper surface or deck *a, a,* rises at an acute angle from the extreme edge of the bottom, forming an inclined plane, which extends longitudinally the whole length of the structure. Through the centre of this caisson, and along its whole length, extends a strong timber beam or keel *d,* which will be the centre of the caisson's floating motion; the top, bottom, and sides of the caisson are supported and strengthened by internal stays or bracings, arranged in any suitable and convenient manner, for the purpose of giving stability to the structure.

The sloping or inclined platform *e, e, e,* is mounted upon the upper surface of the vessel, and firmly secured to it by wooden or iron bracings or stays *f, f, f*; and strong rings *g, g,* are attached, for mooring it securely in any desired place. The lower end of this platform will be immersed in the water, and its face or inclined plane rise therefrom at an angle of about 30°, (in imitation of the slope of a supposed beach,) to a considerable distance beyond the top of the caisson or vessel, thereby offering a modified resistance to the violence of the winds and waves; by which means, their destructive effects will be much lessened, and the water behind screened or sheltered from the action of the tempest.

These floating breakwaters may be made of any dimensions; and, in order to form a sea and wind-barrier, or harbour of refuge, a suitable number may be moored side by side, either in a straight or curved line, as may be required. They are to be connected together by universal ball-and-socket joints, or links and toggle-joints, placed at the ends of the keel or beam *d,* by which they will be allowed to roll upon their centres of gravity, or yield temporarily, in any other way, to the violence of the winds or waves.

The manner of arranging these sea-barriers or floating breakwaters to form a harbour of refuge, is shewn at fig. 2, where they are shewn connected together, in the manner above stated, and are moored to the bottom of the sea by chains or cables, attached at one end to the rings *g, g, g,* of fig. 1, and at the other end to anchors, fixed to the ground, under the water.

In place of the peculiarly shaped caisson or floating vessel, above described, the sloping platform or inclined plane may be attached or connected to a floating frame-work, supported by a number of barrels or other hollow wooden or iron vessels; or the inclined platform may be borne by a wooden frame-work or raft. The platform may be employed even without any floating support, by connecting it, at one end, by means of chains, cables, or otherwise, to the bottom of the sea, in such a manner that the upper edge may rise from the water in an inclined direction.

The patentee does not confine himself to the methods, herein shewn and described, of constructing and floating the improved sea-and-wind barrier; but he claims the employment of portable sloping platforms or inclined planes, partially immersed in the water, in whatever manner, or of whatever materials such inclined planes may be constructed, or in whatever way they may be floated or buoyed up, in or on the water, and held in the required situations, when such portable and buoyant inclined planes are employed for the purposes or objects above stated.—[*Inrolled in the Rolls Chapel Office, August,* 1842.]

Specification drawn by Messrs. Newton and Son.

To Robert Faraday, *of Wardour-street, Soho, in the county of Middlesex, gas-fitter, for improvements in ventilating gas-burners, and burners for consuming oil, tallow, or other matters,—being a communication.*—[Sealed 25th March, 1843.]

These improvements consist in ventilating the burners of gas, oil, or other lamps, by arranging the glass chimneys thereof in such a manner that the products of combustion will rise up an inner chimney, and, instead of passing into the atmosphere of the room or apartment in which the lamp is burning, will be caused to descend, by a downward draft, and be conducted, by a tube or enclosed passage, out of the room.

The mode of applying this invention to all descriptions of lamps will be understood by reference to Plate V., in which fig. 1, represents an argand gas-burner, with the chimneys, shade, and tube thereof, in section. *a*, is the burner; *b*, the supply-pipe; *c*, and *d*, two glass chimneys; *e*, a ground-glass shade; *f*, the gallery for supporting the chimneys and shade; and *g*, the tube for carrying off the products of combustion. The upper end of the chimney *d*, is closed; and, for this purpose, the patentee prefers to use a sheet of mica *h*, surrounded by a suitable frame. The air to support combustion is admitted to the burner through the passage *i*, and the products of combustion, after ascending to the top of the chimney *c*, descend between it and the chimney *d*, into the tube *g*, (as indicated by the arrows,) by which they are conducted into the outer atmosphere; the necessary draft through the tube *g*, when the lamp is first lighted, being obtained, by the application of a gas or other flame, as at *j*, to the exterior of the tube; and, after a short time, the heated products, from the burner, will be sufficient to keep up the draft; or the draft may be obtained, in the first instance, and afterwards maintained, by passing the tube *g*, into a chimney, or by the employment of a rotary fan, &c.

It has been sometimes found, that the sudden shutting of a door created a partial vacuity in small rooms, and a consequent return of the air and heated products through the tube *g*; to prevent this action from affecting the flame, a light valve may be applied to any convenient part of the tube, as at *k*, fig. 2, in order that the air may return through it into the room, instead of passing on to the burner; or the air may be prevented from passing on to the burner by a stop or deflector, suspended over the upper end of the tube *g*, as at *l*, fig. 3, and within the bell-mouthed end of a continuation *m*, of the tube *g*.

The patentee does not confine himself to the shape of the parts, nor the direction in which the tube or pipe *f*, is carried, so long as the apparatus is suitably arranged for causing the products of combustion to pass away from the burner of a lamp, according to the manner described.—[*Inrolled in the Inrolment Office, September,* 1843.]

To ARTHUR DUNN, *of Rotherhithe, in the county of Surrey, soap-boiler, for improvements in treating, purifying, and bleaching oils and fatty matters.*—[Sealed 28th March, 1843.]

THESE improvements consist in subjecting oils and other fatty matters to the action of streams of atmospheric air, which are forced below the surface thereof, and in rising to the surface, agitate them, and carry off the impure odours, and at the same time bleaching the matters under operation.

The oils or fatty matters are kept at a heat of from 170° to 230° Fahr., by steam-pipes, or other means, in any suitable vessel, furnished with a hood, which opens into a chimney, for the purpose of carrying off any vapours that may arise; and the air is introduced, from a blowing apparatus, through perforated pipes, or perforated shallow receivers, at the bottom of the vessel containing the oil; or by numerous small tubes, descending from one or more main pipes, above the oil. The air is introduced into the vessel at the ordinary temperature of the atmosphere; and the time occupied in carrying on the process will vary, according to the extent of bleaching required, and the amount of impurities contained in the oils or fatty matters undergoing the bleaching process.

The patentee states, that this method of treating the above-mentioned substances may be beneficially employed when adding other matters thereto, on account of the agitating effect produced by the streams of air passing through the heated liquid. He claims the mode of treating, purifying and bleaching oils and fatty matters, by causing streams of air to be forced or passed into or through the same, as herein described.—[*Inrolled in the Inrolment Office, September,* 1843.]

To Edouard Joseph François Duclos de Boussois, *of Clyne Wood Works, near Swansea, engineer and metallurgist, for improvements in the manufacture of lead, tin, tungsten, copper, and zinc, from ores, and slags, and other products, and in the manufacture of their alloys with other metals.*—[Sealed 10th June, 1843.]

The first part of this invention relates to the treatment of the above-mentioned ores, slags, and other products, in blast furnaces; and consists in constructing the apparatus in the manner described in the specification of a patent granted to the present patentee, November 11, 1841*; so as to ensure the complete condensation of all metallic fumes produced during the smelting process; taking care to force the gases through water, after leaving the last condensing chamber, in order that a perfect deposition of all metallic or other particles, which might otherwise have been carried away by the draft or blast, may take place.

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* See Vol. XXIII. of our present Series, p. 182.

The second improvement comes into operation when the ores, &c., are not treated in blast furnaces; and consists, chiefly, in submitting them to the reiterated action of muriatic, sulphuric, or other acid, after they have undergone such preparation as would render them soluble in acid, if they were not so by their mineralogical nature; they are then precipitated and separated by such reagents as the case may require.

As regards the manufacture of lead from ores, &c., when they are in the states of oxides, carbonates, silicates, phosphates, or arseniates, they are reduced in the furnace usually employed in the manufacture of lead, having a series of condensing-chambers applied to it; care being taken, during the process, to prevent any access of air, except such as may be supplied from the blast apparatus.

The foregoing process and apparatus is equally applicable for condensing the fumes produced in refining silver, lead, and in the conversion of lead into litharge. When the ores, &c., are in the states of sulphurets, sulphites, or sulphates, they may be either wholly or partially calcined, or treated directly with such a quantity of iron, or iron ore, as would be required to form a compound of iron and sulphur, with the assistance of carbonaceous matter, and thereby reduce the lead to its metallic state; the fumes which may be produced in the treatment being condensed in the manner before mentioned.

In manufacturing tin from its ores, by the application of either furnace, (the condensing apparatus, before mentioned, being used,) all the fumes will be condensed, and a larger quantity of earthy flux can be used, so as to lessen the quantity of tin left in combination with the slag. When tin is to be obtained from slag, the latter should be treated in either of the furnaces, previously alluded to, with such a quantity of flux as will be sufficient to displace the tin and other metals in combination with the slag. The alloy, obtained in this manner, is dissolved in muriatic or sulphuric acid, to obtain the various metals separately. When muriatic acid is used, the tin and iron will be dissolved; leaving, nearly untouched, any tungsten which may exist in the product operated on; the tin can be precipitated, in a metallic state, by the use of zinc, or in the state of sulphuret of tin, by the use of sulphuret of hydrogen, or any other sulphuretted base; in the latter case, metallic tin can be obtained from the sulphuret by a proper calcination, and a subsequent reduction of the oxide thereby obtained; and when sulphuric acid, properly diluted, is used, the iron only will be dissolved, and a useful alloy may be obtained, by fusing together the tin and tungsten, with the assistance of a flux. The foregoing treatment is applicable for obtaining tungsten from tungstate of lime.

The course pursued in the manufacture of tungsten from its ore, called woolfram, is to reduce the latter, by the use of an alkaline base, in a proper furnace or crucible, at a high temperature; the product being then dissolved in muriatic or sulphuric acid, the tungsten is left in a metallic state. An alloy may be obtained from the ore, by the use of an oxide of tin, copper, or iron, with a suitable flux; and from this alloy the tungsten can be separated by treating it with acid.

As regards copper ores, &c., they are converted into carbonates or oxides, by a preparatory calcination, and then exposed in a vessel to the action of sulphuric acid, in the gaseous state, or otherwise; the acid combines with the oxides, and the soluble sulphates, thus formed, will be dissolved and concentrated by the repeated levigation of the mass with water, until it becomes sufficiently concentrated to permit of the copper being precipitated from the sulphates, either by means of iron, or sulphuret of hydrogen, or other sulphuretted bases. The sulphates left after this treatment may be concentrated and crystallized, in the manner usually practised. The patentee also describes, under this head of the invention, a method of producing sulphuric acid, by treating the sulphurets of iron, copper, zinc, or other metals, in a furnace similar to that described in the specification of his patent of May 31, 1838*, with this modification, that a blast of air is employed, at a pressure above that of the atmosphere.

As regards the manufacture of zinc, in addition to the process described in the above specification, the patentee claims the use of the condensing apparatus, before described, either applied to blast, air, or reverberatory furnaces.

The third part of this invention consists in the manufacture of the following alloys:—An alloy of tin and tungsten, composed of from sixty to ninety-five parts of the former, and from forty to forty-five parts of the latter. An alloy of tungsten and copper, in the above proportions. An alloy, formed by combining either of the usual alloys of tin and copper with the like proportion of tungsten. An alloy of zinc and tin, composed of from ninety-five to ninety-seven parts of the former, and from three to five parts of the latter. An alloy of zinc and copper is formed in the following manner:—A muffle, crucible, or pot, is half filled with a mixture of calcined zinc ores and carbonaceous matters, and upon these a tray, made of the same material as the pot, is placed, fitting exactly within the pot. This tray contains the copper required to form the alloy, and has a number of small apertures in it, to allow of the vapours of the zinc combining with the copper, but, at the same time, prevent the contact of the ores and flux therewith. The vessel being closed, the process is carried on in the same manner as zinc ores are usually reduced. The fumes of the zinc combine with the copper, in a regular and constant proportion, and the oxides of zinc, escaping, may be condensed. When the process has been carried on for a sufficient length of time, the muffle is opened, and the divided alloy, found on the tray, is melted in a proper vessel, and the process repeated; to this alloy three per cent. of tin may be added. From the alloy thus obtained, another alloy may be produced, containing from four-tenths to five-tenths of its weight of zinc, by the addition, during the re-melting of the alloy, of as much metallic zinc as would be required to constitute an alloy of the above proportions; and by the addition to this alloy of from three to five per cent. of tin, a still further improvement is effected.

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* See Vol. XIX. of our present Series, p. 338.

The patentee claims the improved process, above described, of condensing the fumes produced in treating lead ores, slag, or other products; the same in treating tin ores; also in treating copper ores; also in treating zinc ores, without claiming any apparatus hitherto used in such manufacture; but claiming, in the manufacture of the above metals and alloys, the manner of using sulphuric acid. He also claims the treatment of tin slags and other products, as above described, and the treatment for the production of tungsten; also the invention of various alloys of metals, in the proportions above stated; and lastly, the mode of alloying zinc, from its ores, with copper, as described.—[*Inrolled in the Inrolment Office, December,* 1843.]

To WILLIAM WATSON, *Jun., of Leeds, in the county of York, chemist, for certain improvements in ventilating houses and other buildings.* [Sealed October 18th, 1843.]

THE object of this invention is to supply cities and towns, which are at present enveloped in smoke and other noxious gases, proceeding from furnaces, &c., with pure air, and thus to render dwelling-houses and other buildings situated in such towns less unhealthy, by giving them a perfect ventilation. This improvement is proposed to be effected by procuring air for the ventilation of buildings from a considerable elevation (where the air is unmixed with the smoke, &c., which hangs over the city), by means of a high shaft, pipe, or other tubular column; instead of obtaining it from the level on which the buildings are erected.

The patentee does not claim or describe any particular arrangement of machinery, or apparatus, for drawing or bringing down the air from above, through the column before mentioned; but states that any contrivance suitable for effecting this object may be used, such, for example, as rotary fans, bellows, or air-pumps; and the air, when procured, may be conveyed to the buildings by pipes or tubes, in the same manner as gas, and diffused throughout the several parts of such buildings in any manner that is now employed, or may be hereafter devised, for ventilating buildings.

When a number of good houses congregated together require ventilation, as is the case in many manufacturing towns, where squares, streets, or other plots of building, consisting of large well-built houses, have become nearly abandoned by their original inhabitants, in consequence of the bad state of the air which surrounds them, it is proposed to erect a hollow column or shaft, in the middle of the square or plot, or other convenient situation, and raise it to a considerable altitude above the tops of the houses, and by causing a large fan or bellows to rotate with considerable rapidity at the bottom of the shaft or column (which may be easily affected by means of a small steam-engine) pure air may be drawn in large quantities down the shaft into a chamber below, where it can be warmed or cooled according to the state of the weather and other circumstances. This warm or cold air may then, by means of the aforesaid rotary fan or bellows, be propelled along pipes, and conveyed to the several apartments of the surrounding houses.

The patentee does not claim the application of this mode of ventilation to ships, as a plan in some respects similar is adopted to carry down fresh air into the holds and engine-rooms of steam vessels, nor does he intend to claim the ventilation of mines, pits, or buildings below the surface of the earth, as, although the air for ventilation is brought from an altitude considerably above, yet it will be observed, that this air is brought from or near to the earth's surface; but he claims the ventilating of houses or other buildings by means of a column, shaft, tube, or pipe, raised to an altitude considerably above the tops of the surrounding houses, whereby air of a purer quality may be drawn down the said column, shaft, tube, or pipe, from a higher region than that in which the houses are situated, and distributed throughout the several apartments in any mode now adopted for this purpose.—[*Inrolled in the Rolls Chapel Office, December,* 1843.]

Specification drawn by Messrs. Newton and Son.

To Richard Laming, *of Radley's Hotel, New Bridge-street, Blackfriars, in the city of London, Gentleman, for his invention of certain improvements in the purification and application of ammonia to obtain certain chemical products.*—[Sealed 13th July, 1843.]

That part of the invention which relates to improvements in the purification of ammonia, is for the purpose of obtaining ammonia, sufficiently pure for many purposes in the arts, from gas-water, by substituting, for the mineral acids usually employed, a solution of muriate of lime. The process pursued by the patentee is as follows:—He first mixes with gas-water a sufficient quantity of muriate of lime, in solution, to convert the carbonate of ammonia, which is present, into muriate of ammonia; and after having separated the carbonate of lime which forms, the remaining solution is exposed for an hour to a boiling temperature. This solution, after having been cooled, is first agitated with enough hydrated oxide of iron to combine with all its sulphuretted hydrogen; secondly, with lime enough to saturate the muriatic acid which is present; and finally it is distilled. The ammonia will be found in the water, which comes over in a tolerably pure state.

The patentee does not claim to have discovered the use of any of the chemical substances, nor to have invented any of the chemical processes above-named, individually; but he claims that particular combination and order of processes above described.

That part of the invention which relates to improvements in the application of ammonia, is as follows:—Ferrocyanuret of potassium and ferrocyanuret of sodium, known in commerce as prussiate of potash and prussiate of soda, are usually made by burning animal matter in contact with a carbonated alkali, and with iron. The ammonia evolved from the animal matter is partly decomposed by the other substances, and assists in forming with them a heterogeneous mass, consisting principally of potassium or sodium (according to the kind of alkali used), carbonated alkali, cyanogen, iron, and charcoal.

This mass, by lixiviation and crystallization, affords the ferrocyanuret.

The ferrocyanurets of potassium and sodium are the sources from which hitherto has been derived, directly or indirectly, the cyanogen used in making all the other ferrocyanurets, cyanurets, and hydrocyanates known in commerce.

Commercial prussic or hydrocyanic acid has hitherto been made by decomposing, either the ferrocyanuret of potassium, the ferrocyanuret of sodium, or some other ferrocyanuret, cyanuret, or hydrocyanate, resulting directly or indirectly from one or the other of them. It is evident, from these facts, that prussic acid can never have been available for the reproduction of any of the cyanurets, ferrocyanurets, or hydrocyanates, sufficiently cheap for the purposes of commerce. Now, by these improvements, ammonia is so applied to the production of cyanogen, as to make prussic or hydrocyanic acid the primary result, and at a cost low enough to admit of its application to the economical production of the cyanurets, ferrocyanurets, and hydrocyanates generally. The improved process is as follows:—A cylindrical retort of cast iron, eight feet long and eighteen inches internal diameter, lined with fire-tiles fitted to its shape, and set vertically in a furnace, is filled with pieces of charcoal, and brought to a red heat. Ammonia, more or less pure, in the form of gas, or even combined in a state of vapour with certain other substances, which do not prevent the desired result, is introduced by a pipe near one end of the heated retort. In its passage, the ammonia is deprived of its constituent hydrogen; while the remaining part, together with its nitrogen, combine with carbon to form prussic or hydrocyanic acid, which finally escapes from the heated vessel in the form of vapour, accompanied by other elastic matters, amongst which will be, if the admission of ammonia into the retort has been too rapid, some of that substance in an undecomposed state. The prussic-acid vapour thus obtained may be condensed in water, or by other convenient means, for subsequently making the compounds of cyanogen, or other purposes; or it may be brought at once into communication with the several substances with which it or its constituent cyanogen is to be combined. Thus, for example, it may be received into caustic solutions of the fixed alkalies, and with them made to dissolve iron, giving rise, in the first instance, to solutions of hydrocyanates of potash and of soda, and afterwards to solutions of the ferrocyanurets of potassium and of sodium; or it may be received into water containing certain metallic oxides, with which it will make the corresponding metallic cyanurets or hydrocyanates. The means for producing chemical products by the saturation of acids with different bases, are too well known to chemists to render necessary any further detail of the means to be adopted for obtaining hydrocyanates, cyanurets, or ferrocyanurets, by the chemical combination of hydrocyanic acid and the several bases.

The patentee claims, under the second head of his invention, the making of prussic or hydrocyanic acid on a scale of commercial magnitude, by the re-action, at a red heat, of any convenient form of carbon and ammonia, (either alone, or combined with such other bodies as do not materially impair its efficacy), by whatever apparatus or means the said re-action may be established; and he further claims, in connection with the second part of the invention, the use of prussic acid, so made, for saturating and dissolving bases, and thus giving existence to cyanurets, ferrocyanurets, and hydrocyanates, and for all other purposes to which prussic acid, so made, is or may be usefully applicable.—[*Inrolled in the Inrolment Office, January*, 1844.]

Specification drawn by Messrs. Newton and Son.

To JOSEPH BETTELEY, *of the Brunswick Anchor Works, Liverpool, chain cable manufacturer, for improvements in windlasses and machinery for moving weights.*—[Sealed 11th August, 1842.]

THE improvements in machinery for moving weights, as specified by the patentee, are six in number: the first consists in a mode of applying what are termed "windlass-bars," to work the barrels of windlasses, and other machinery for moving weights where a similar barrel is to be turned round; the second, in a mode of applying a "chock" or stop, as a substitute for, or in aid of, the palls of windlasses; the third, in a method of varying the length of lever-handles for working windlass-barrels; the fourth, in applying cranks to give motion to bars or levers for working windlass-barrels; the fifth, in a mode of constructing iron-bodied windlass barrels; and the sixth, in a method of applying friction-bands for working windlass-barrels.

In Plate VI., fig. 1, is a transverse section, and fig. 2, a plan view, partly in section, of a windlass. *a*, is the windlass-barrel, furnished with a ratchet-wheel *b*, and palls *c*, and turning in bearings *d*, as usual. Upon the central portion of this barrel two hoops *e*, *e*, are fixed, having a circular groove in each side, and on these hoops the windlass-bars *f*, act, in order to turn the barrel. The form of the windlass-bars will be best seen by reference to fig. 3, which exhibits a plan and section of one of them; each bar is composed of two pieces, bound together by a ring *g*; the larger ends of the bars embrace the edges of the hoops *e*, (the parts f^1, entering the grooves of the hoops,) and the smaller ends are connected by chains *h*, to the sockets *i*, that receive the ends of the handles *j*, by which the windlass is worked. As the handles *j*, are moved up and down, each of the windlass-bars will be alternately raised and lowered by the chains *h*, and a continuous revolution of the barrel *a*, will be the result; for when each bar *f*, is descending, the parts f^1, slide freely within the grooves in the hoops *e*; but immediately the outer end of the bar is raised, the parts f^1, and f^2, will firmly gripe the hoop *e*, and carry round the windlass-barrel. The patentee does not confine himself to the precise form of windlass-bars *f*, and hoops *e*, above shewn, so long as the action is the same.

Fig. 4, is a transverse section of a windlass-barrel, and fig. 5, is a sectional plan view of part of the same, with the above improvement applied thereto, but slightly varied from the preceding arrangement; the hoop *e*, instead of being circular, is formed with several sides, and the shape of the parts f^1, and f^2, of the windlass-bar, (as seen in the detached view, fig. 6,) is changed. In fig. 4, is also shewn the mode of applying chocks, according to the second improvement, when riding a ship by the windlass, in order to save the palls, which may be used in conjunction with the chocks, or thrown out of action, so that the whole strain on the windlass-barrel may be resisted by the chocks. *k*, is a chock, which is attached to one of the holes in the hoop *e*, by a chain and hook; and, consequently, when there is any strain that would tend to draw the barrel back, the chain will pull the chock close under the hoop *e*, and effectually prevent any further movement of the windlass-barrel.

Where very powerful windlasses are used, the peripheries of the hoops *e*, are grooved transversely; and as the parts f^2, of the windlass-bars are liable to wear, wedge-shaped pieces, grooved on the face, are fixed thereon. In some cases, the wedge-shaped pieces may be allowed to slide up and down between the side-plates of the windlass-bars, being guided by pins or projections, working in slots in the side-plates. Fig. 7, is a transverse section of a windlass-barrel, with this description of windlass-bar applied to it; *l*, is the wedge-shaped piece, the pins of which work in grooves in the side-plates *f*, permitting the windlass-bar to descend easily, but causing it to take a firm hold of the hoop *e*, when it is being raised.

The mode of varying the length of the lever-handles is represented in fig. 8. The handles *j*, have a number of holes in them, and are secured in the sockets *m*, by inserting a pin through one of these holes, and through a hole in the socket. It will be seen that the handles may be adjusted to any length, by sliding them through the sockets *m*, and then inserting the pins. In this figure, the fourth improvement is also shewn; it consists in forming cranks *n*, on the axis or shaft of the sockets *m*, and connecting them by chains, or other suitable means, with the windlass-bars *f*.

The fifth improvement consists in forming iron-bodied windlass barrels with flutings in the direction of their length, in order to obtain a better holding for the cable. Fig. 9, is a transverse section of a barrel, the flutings of which are formed by pieces of wood *o*, secured thereto; and fig. 10, is a transverse section of a barrel without wood filling-pieces.

The method of working windlass-barrels by friction-bands is represented in fig. 11. *p*, is the friction-band, and *q*, *q*, are pieces of wood, secured thereto, which embrace the wheel *r*, on the windlass-barrel; *s*, is a lever that connects the ends of the band *p*, with the apparatus for working the windlass.

The patentee claims, as his invention, Firstly, the mode of applying windlass-bars, in combination with suitable hoops or wheels, on windlasses and such like barrels, for raising weights, as described. Secondly,—the mode of applying "chocks" for holding the windlass-barrel, when riding a ship or vessel. Thirdly,—the mode of regulating or varying the length of lever handles, for working windlass-barrels. Fourthly,—the mode of giving motion to windlass-barrels, when arms or levers are used, by applying cranks, as herein described. Fifthly,—the mode of constructing windlass-barrels of cast-iron, with flutes. Sixthly,—the mode of applying friction-bands, lined with wood, for giving motion to windlass-barrels.—[*Inrolled in the Inrolment Office, February,* 1843.]

To William Ritter, *of Fenchurch-street, in the city of London, Gent., for improvements in crystallizing and purifying sugar,—being a communication.*—[Sealed 11th January, 1843.]

The first improvement proposed consists in purifying raw sugar, or even the lowest description of sugar, in a few days, and at a very small expence, by the use of purifying cases or vessels, of the construction represented in Plate VI.

Fig. 1, is a vertical section, taken through the centre of the case *a*, which may be made of wood, or any other suitable material; and *b*, is a false bottom of wire gauze, resting upon metal rods *c*. The bottom of the case is lined with sheet zinc *d*, and in the lower part of one of its sides an opening *e*, is made, through which the zinc extends, and forms a lip *f*, to conduct the molasses, &c., that drain from the sugar, into the funnel *g*, which is attached to the case by the bars *h*, *i*.

The method of purifying sugar by means of these cases is as follows:—The cases are placed in the purifying-house in ranges, one above another, and a mixture of equal quantities of raw sugar and sugar syrup or molasses is poured into them; the syrup or molasses immediately begins to drain through the wire gauze, and is conducted by the funnel *g*, into troughs, leading to tanks or receivers; the crystals of sugar remaining in the cases, in the form of a spongy bulk, similar to sugar in the bastard forms, after draining. When the molasses or syrup has drained off, (which will be in about twenty-four hours,) the upper surface of the sugar is smoothed, and it is submitted to the process of "*clairçage continu*, or repeated purification;" which consists in pouring upon the smoothed surface successive coverings of a saturated solution of sugar, increasing in purity as the sugar in the cases becomes more and more purified from molasses, coloring matter, &c. Thus, the first covering is a solution of sugar which has been previously used four times in washing other sugars; the second covering is a solution which has been used thrice; the third covering, twice; the fourth covering, once; and the fifth or last covering is a solution of pure sugar, which has never been used before. The liquids or runnings, resulting from these washings, are collected separately, and are employed in future operations in the following manner:—The first runnings, containing the most impurities, must be boiled, to prevent fermentation, and then treated in the manner described under the second improvement, for the purpose of obtaining from it all the sugar it contains; the second runnings form the first covering for the next quantity of sugar operated upon; the third runnings form the second covering; the fourth runnings form the third covering; and the fifth runnings form the fourth covering.

These successive operations proceed from day to day, as fresh quantities of sugar are treated, and the contents of each case are only once covered with a solution of pure sugar; the result is a complete purification, without any waste of the purified sugar thus added, as the water, in which it was dissolved, leaves it, and, uniting with the molasses, &c., passes off through the wire gauze.

The purifying house should be constantly charged with damp, to a sufficient degree to prevent any drying of the syrup or molasses. The purified sugar, remaining in the cases, comes out crystallized in the form of raw sugar, and may be dried in two days, by exposure in the open air.

The second improvement consists in extracting pure sugar from solutions of sugar, or from weak and impure syrups, so as to form refined sugar.

The solutions or syrups which are not too much exhausted, and contain at least one-third of crystallizable sugar, should be concentrated, by boiling, either in vacuo or in the atmosphere, until they contain no more than one part of water to three parts of sugar. The syrup is then either cooled or heated, (being cooled, if it has been boiled in the atmosphere, and heated, if the boiling has been performed in vacuo,) and is stirred until it has acquired the consistence of a jelly, with a temperature of about 190° Fahr., after which, it is removed to the crystallizing cases, represented at figs. 2, and 3. Fig. 2, is a section, taken through the centre of the cases; and fig. 3, a front view of it, with the funnel *o*, and stoppers *l*, removed. It consists of a square vessel *j*, in the front of which, at the lower part, seven holes *k*, one inch in diameter, are made; these are closed by seven wooden stoppers *l*, formed with square heads, in order that they may be easily turned, for the purpose of loosening the crystals from them, previous to their withdrawal from the holes *k*; the smaller ends of the stoppers entering openings in the bent plate *m*. The bottom of the case is slightly inclined towards the front, to facilitate the discharge of the syrup through the holes *k*. *n*, is a lip to conduct the syrup in the funnel *o*; and *p*, is one of three hooks or supports for the funnel.

The "bulk" or syrup is stirred from time to time with a wooden spatula, until it is at a temperature of 145° Fahr., and is then left to crystallize, which generally takes place in about twenty-four hours. When the crystallization is complete, the cases are taken into the purifying house, and arranged one above another, in the same manner as the purifying cases; the stoppers *l*, are then taken out, and the syrup allowed to drain off. After this, the crust on the top of the sugar is broken, the upper surface smoothed, and it is subjected to the process of "repeated purification," before described; the last running coming out quite pure. The sugar is now turned out of the cases, and the somewhat moist and inferior-colored surface is removed with a trowel, and either used as a "covering" in the process of repeated purification, or put into the case at a future filling, to complete its purification.

From the two processes above described, a syrup will result, too much charged with impurities to be available for the purification of another portion of sugar by "covering," and it must be boiled without delay, to prevent fermentation. Similar syrups, and, in general, all syrups which are too weak to afford a sufficiently strong crystallization, must be boiled to the "candis proof." After boiling, these syrups are poured into large reservoirs, to crystallize; and when the crystallization is finished, the "bulk," which forms a mixture of crystals of sugar and molasses, is put into the purifying cases, to separate the crystals from the molasses.

The third improvement consists in converting the disintegrated sugar, produced by the first or second improvements, into loaf sugar.

A large quantity of the sugar is dissolved in pure water, and filtered and clarified, if necessary; it is then boiled, at a temperature not exceeding 232° Fahr., under atmospheric pressure, until it contains not more than one part of water to three parts of sugar; and then a suitable quantity of perfectly pure sugar is added to the boiling "bulk," so as to bring it up to proof by the addition of sugar, instead of evaporating the water. The contents of the boiler are now removed therefrom, and made into loaves in the usual manner; but the subsequent bleaching of the sugar in moulds, if required, must be performed by the process of "repeated purification," and not by the ordinary claying process; and the runnings therefrom must be used direct for making refined sugar, or as "coverings" for sugar in the process of purification, according to its quality. The runnings or liquor having drained from the loaves, they are cleaned, dried, and packed for the market, as usual.

The patentee claims, Firstly,—the particular apparatus described, consisting of the purifying and crystallizing vessels, by means of which the several processes of draining, crystallizing, and purifying sugar are effected. Secondly,—the manual and mechanical process of "*clairçage continu*, or continued purification," by means of washing the sugar contained in the above-mentioned cases or vessels, combined with a metallic or other web in the purifying cases, or in conical forms, with or by continued applications or "coverings" of sugar syrup, of rather superior quality in each operation to the sugar under treatment; whereby the most impure sugar is washed consecutively with better and better "coverings" of syrup, until a solution of pure sugar is used in the last washing only, to complete the process. Thirdly,—the collection of crystals of sugar from exhausted syrups, by boiling or mixing them with impure sugar, so as to bring about a further crystallization of the sugar remaining in them; and also by boiling very weak syrups at a very low temperature, and allowing them to stand in large reservoirs until crystallization has taken place, in combination with the subsequent use of the purifying vessels, whereby the crystals are afterwards separated, and purified by the *clairçage continu*. Fourthly,—the concentration of solutions of pure sugar, when heated to about 230° Fahr., by the addition of a proper quantity of pure sugar, instead of evaporating the water, to produce the said concentration, for removing into the cooler, and being then conveyed into the conical moulds, in the usual manner.—[*Inrolled in the Inrolment Office, July,* 1843.]

To WILLIAM COOK, *of King-street, Regent-street, and Liquorpond-street, in the county of Middlesex, coach-maker, for improvements in carriages**.—[Sealed 22nd February, 1840.]

THIS invention relates to those carriages wherein German shutters are used, for the purpose of closing them; and consists in the application of certain mechanism to facilitate the moving of such shutters.

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* By a Memorandum of Alteration, bearing date April 5th, 1843, the above title has been altered to "improvements in carriages wherein German shutters are used, as to the mode of moving and working such German shutters."

The German shutter, shewn by the patentee, is composed of three glazed leaves; the first or upper leaf is hinged to the frame, which is fixed in the head of the carriage; the second leaf is hinged to the first, and the third leaf to the second, in such a manner as to admit of their being folded together, and raised above the heads of the passengers. Now, in order that the shutters may be easily opened or closed, they are connected, by cords, with three or more spring-barrels, similar to the spring-barrels of clocks or watches, and contained in a box, affixed to the head of the carriage. When it is desired to raise or fold up the shutters, the person within the carriage pulls the third or lower leaf inwards, by means of a small strap, and the spring-barrels then, winding up the cords, raise the shutters, which can be readily lowered again by pulling the above strap.

The patentee claims "the mode of combining the parts, as herein described, and applying them to carriages, for facilitating the moving or working of German shutters by springs." —[*Inrolled in the Inrolment Office, August,* 1840.]

To Edmund Morewood, *of Highgate, in the county of Middlesex, Gent., for an improved mode of preserving iron and other metals from oxidation or rust,—being a communication.*—[Sealed 27th August, 1841.]

This mode of preserving metals from oxidation consists in first tinning the articles, and then zincing them, so that the outer surface may be zinc, placed in such relation with the tin, and the article to be preserved, that the tin and zinc will have a combined influence in preserving the iron or other material.

The article to be preserved must be composed of metal which will not fuse below 1200° Fahr.; it is first tinned by any of the means now in use; and then, after being well cleaned, is immersed in molten zinc, of the purest kind, the surface of which, having been carefully skimmed, is to be covered with a flux of sal-ammoniac. The article must remain immersed in the molten zinc until the zinc surface, on withdrawing it slowly, presents a smooth and even appearance; it is then to be thoroughly washed in clean water, and dried in bran or saw-dust. If the article be so large that, on being immersed, it would sensibly lower the temperature of the molten zinc, the patentee heats it, before immersion, but not so much so as to soften the coating of tin; and, previous to taking it out, he moves it gently about in the molten zinc.

After describing the above mode of preserving metals from oxidation, the patentee says, "I claim, as the invention communicated to me, the preserving of iron, and other metals capable of being tinned, and fusing at a temperature of not less than 1200° of Fahrenheit, from oxidation, by tinning them, and then dipping the tin covering or surface in molten zinc, as aforesaid, or otherwise coating the said tin covering or surface with zinc, in such manner that an union or contact shall take place between the surfaces of the zinc and tin; whereby I cause a united or combined influence to be exerted in the preservation of the said iron or other metal; and which influence I believe to be, that the zinc prevents the destructive effects of the tin upon the iron or other metal, when tin alone is used; and that the tin lessens the destructive influence of the iron or other metal upon the zinc, when zinc alone is used to cover the said iron or other metal."—[*Inrolled in the Inrolment Office, February,* 1842.]

To SOLOMON ROLINSON, *of Dudley, in the county of Worcester, roll-turner, for certain improvements in the manufacture of shot.*—[Sealed 20th March, 1843.]

THIS invention consists in manufacturing iron shot from malleable or wrought iron, by cutting, compressing, and rolling it, instead of casting the shot, as usual.

A round bar of malleable or wrought-iron is heated to nearly a welding heat, and divided, by a circular saw or shears, into pieces, corresponding with the weight of the shot intended to be manufactured, (making a small allowance for waste in the subsequent processes); these pieces are then rounded, by submitting them to pressure in spherical moulds, and are finished by passing them through the rolling-mill represented in Plate VI. Fig. 1, is a plan view of the machine; fig. 2, a back view; and fig. 3, a transverse section, on the line A, B, of figs. 1, and 2. *a*, is the sill or foundation-frame of the machine; *b*, the bed-plate, bolted to the sill; *c*, *c*, "housings" or carriages, secured to the bed-plate, and supporting the axis of the grooved roller *d*; and *e*, is an additional housing or carriage, which supports the quadrant-shaped cup *f*. In the cup *f*, three semicircular grooves are made, corresponding with those in the roller *d*, and forming, with them, three circular channels; into the entrances of which the pieces of iron, whilst hot, are dropped, and, by the revolution of the roller *d*, (which is driven by a band from a steam-engine or other prime mover,) are forced through them. This process of rolling may be repeated as many times as the operator considers it necessary.

If the shot are required to be made of any modification of the circular form, the grooves in the roller *d*, and cup *f*, can be altered to suit the same.

The patentee claims "the manufacturing of iron shot by the combination of means for cutting, compressing, and rolling, before described; of which means, separately considered, some are, as before explained, old, and some new; but all are new in the general combination thereof, for the purposes of the present invention."—[*Inrolled in the Inrolment Office, September*, 1843.]

To JAMES CLEMENT, *of Liverpool, for improvements in composition for ornamenting glass and picture-frames, and articles for interior and other decorations; also for the manufacture of toys and other fancy articles.*—[Sealed 4th March, 1842.]

THE invention for which this patent has been obtained consists in producing a composition or compositions, to be applied to ornamenting glass and picture-frames, and articles for interior and other decorations, and for making toys, &c., by combining the paste or pulp of potatoes with any other suitable materials, in a pulverized state.

The potatoes are boiled, steamed, or roasted, as if intended for the table; and are then bruised, and mixed with some finely pulverized substance, such as saw-dust, turf, the waste bark from a tan-yard, or any other fine powder that can be obtained at a small cost; this mixture is worked into a fine paste, by rolling and beating, and is then ready to be moulded into the required forms.

In concluding his specification, the patentee says, he wishes to have it understood, that his invention does not depend upon the materials employed in combination with the potatoes; the object of the invention being, to apply the pulp or paste of potatoes, in combination with suitable powdered materials, to produce a composition to be formed or moulded into the shapes desired, for the purposes above mentioned.—[*Inrolled in the Inrolment Office, September,* 1842.]

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 60, Vol. XXIV.)

June 20th, 1843.

The President in the Chair.

A Pressure-Gauge was presented for the Museum of the Institution by Alfred King, M. Inst. C. E.

This gauge, which has been used at the Liverpool gas-works for more than ten years, for indicating small amounts of pressure, consists of a close cistern containing water, in which is a cylinder having in it a hollow float, connected with a balance-weight, by a fine silken cord, passing over a pulley, on the axis of which is fastened a pointer, one end of which marks the amount of pressure upon a dial, divided in such a manner, that as each division is equal to a column of water 1-10th of an inch, a difference equal to 1-50th, or even 1-100th of an inch, may be estimated.

The action is very simple, the float being elevated by the rising of the water within the cylinder, when the surface is depressed in the cistern by the pressure of the current of gas from the inlet pipe.

The description was illustrated by a diagram, shewing the internal construction of the gauge.

"Description of a Machine for raising and lowering Miners."

By John Taylor, M. Inst. C. E.

The author states that the great depth to which the copper and tin mines, in Cornwall and in Germany, had been worked, had drawn simultaneously, in the two countries, the attention of engineers to some mode of facilitating the ascent and descent of the miners, whose strength was exhausted, and their health seriously affected, by the fatigue of going to and returning from the scene of their labours by nearly vertical ladders, as the men could not be raised and lowered by the rope of the winding engines, as in the coal districts. The Polytechnic Society of Cornwall offered premiums for machines for effecting this object, and in 1834 three prizes were respectively awarded to Mr. Michael Loam, Capt. W. Nicholas, and Capt. W. Richards, for plans, the two first of which embraced the principle which has since been adopted with modifications, both in Germany and in Cornwall. A premium was also offered by Mr. Tremayne for any new method, or for the most available improvement on the former plans, and was awarded in 1838 to Mr. John Phillips, for a method, differing, however, from that which has been put in practice. About this time it was ascertained that a machine, somewhat similar to that designed by Mr. Michael Loam, had been applied with success, to one of the deepest mines in the Hartz; and drawings, with a description, were published in the Report of the Polytechnic Society of 1838. Mr. Charles Fox also commenced a subscription, for the purpose of awarding a sum of money to any proprietor of mines who would first bring into active operation efficient machinery, adapted for the purpose in question.

At length, the adventurers of the Tresavean copper-mines, undertook to erect a machine from the designs, and under the superintendence, of Mr. Michael Loam; it was first used for a depth of 27 fathoms, on the 5th of January, 1842; has since been extended to 264 fathoms; and it is now contemplated to carry it to the lowest part of the mines, which is 288 fathoms deep.

The machine, which is worked by a steam-engine with a cylinder of 36 inches diameter, consists of two rods, to which are attached, at intervals of 6 feet throughout their length, platforms, upon which the men stand: these rods receive an alternating motion from two cranks, which give them a stroke of 12 feet; the men, either in ascending or descending, step from one platform to the other, as the rods remain for an instant almost stationary, when the cranks are going over the top and bottom centres; and as the platforms are half the length of the stroke apart, one set of men can ascend while another set is descending, without at all interfering with each other. Each rod makes three strokes per minute; and when once the platforms are filled with men, they are landed at the rate of six men per minute, either going up or down; the speed of travelling being about 72 feet per minute, or 240 fathoms in 20 minutes. By the ordinary mode of ascending by ladders it would have occupied 48 minutes to mount from the same depth, as the usual speed is about 30 feet per minute, so that more than 50 per cent. of time is saved, independent of the diminution of fatigue.

The rods at the Tresavean mine act vertically for the first 70 fathoms, below which they follow the direction of the vein, diverging from the perpendicular from 6 inches to 18 inches in 6 feet. The action of the apparatus is stated to be perfectly successful; no accident has occurred in the use of it, and the miners are convinced of the safety as well as the ease afforded by it.

Mr. Taylor observed, that there was an extraordinary coincidence of time in the appearance of this invention, as the public attention, both in Germany and in England, seemed to have been directed to the subject simultaneously, without any correspondence between the engineers of the two countries. There had been many competitors for the premiums offered in Cornwall for the best method, but the only successful plans were those mentioned in the paper; and the machine, therein described, was a combination of the plan proposed by Mr. Loam, and that actually in use in the Hartz mines.

Mr. Buddle recollected, many years ago, seeing a model of a somewhat similar machine, which had been in use in Germany for fifty years; it consisted of two rods, upon whose sides were hooks, at given distances, which, on receiving a reciprocating motion, were alternately engaged on the opposite handles of the "kibble," containing the ore, which was thus raised to the surface; it was probable that the idea of raising the miners had been taken from this old machine.

Mr. Taylor replied that he did not think Mr. Loam knew of the existence of any machine of the kind, and that the first impulse given to the subject was by the premiums offered for the best method, which had directed the attention of engineers to it. An American machine, somewhat similar to that described by Mr. Buddle, had been exhibited in London, by Mr. Slade: it was designed for raising ore and water, but Mr. Taylor thought it applicable to raising the miners, and directed the attention of the patentee to the subject, but the machine was not successful.

In answer to a question from the President, Mr. Buddle said that the system was not applicable to the mines at Newcastle, as the men went up and down by the rope. By the use of guides and slides, the rate of drawing the coal to the surface was generally about 18 feet per second, which was not, however, considered sufficient, and a greater velocity was contemplated.

"Description of Annular Valves used for Pumps for Water-works, &c."—By Richard Hosking.

The annular valve consists of three concentric rings, arranged pyramidally, and resting one upon the other, thereby affording a free passage for the water around the circumference; the upper ring is attached to a stalk, and the two lower ones have internal wings, which serve as guides when the rings are in motion.

The chief advantages afforded by these valves, are stated to be an increase of water-way, and a reduction of concussion, for as the concussion occasioned by the shutting of pump-valves is in proportion to the surface in contact, and the square of the height or distance passed through while in the act of shutting, the greater the number of parts of which the valve is composed, the greater will be the freedom of water-way, and consequently the burthen on the engine and the concussion will be proportionally diminished.

These valves were first used in two 30-inch pumps, at the Waldersea Drainage, near Wisbeach, and they have since been introduced into the Royal Polborro Consols Mine, and the Vauxhall Water-works.

" On the construction of Valves used in Pumps for raising water." By Samuel Collett Homersham, Assoc. Inst. C. E.

The author first describes the original leather-flap valves which are in common use, shews their defects, the modifications which have been introduced in them, and the reasons why a better kind of valve was necessary, particularly for large pumps appended to steam engines, quoting from Mr. Wickstead's work on the Cornish engine, that by the closing of the valves at the East London Water-works, the whole of the engine-house was shaken. This led to the application, by Messrs. Harvey and West, of a modification of the double-beat steam valve, only making it self-acting; by this, it is stated, the concussion is so much reduced, that little inconvenience is felt from it. No air is required to be admitted beneath, as is frequently the case with common valves, consequently the pump, when at work, lifts its full complement of water.

The author states, that in this valve the diameter of the top seating is somewhat smaller than the lower, for the purpose of allowing a sufficient area for the pressure of the water to act against in lifting it. He remarks, that the pressure required to open these valves appears to vary from 2 lbs. to 5 lbs. per square inch, and that it does not seem to follow any uniform rule. The seatings which answer best, are composed of pieces of wood fitted in a groove, with the fibres in a vertical position. The principal advantages of this kind of valve, as to durability, slight concussion on closing, facility of repair, &c., are then enumerated; but it is urged against them that the passage for the water is circuitous, and therefore the power required to force the water through is considerable, and that in a large valve the height to which it rises is too great.

He then states that Mr. James Simpson, who has had great experience in the difficulties attendant upon the use of large pumps, some years since conceived the idea of obtaining valve openings nearly equal to the full area of the clack chambers, by means of a conical valve, formed of rings, shutting down upon each other; this was afterwards modified into a valve with separate seatings for the rings to fall upon, allowing a passage for the water both inside and outside the rings, thus obviating the necessity of their lifting more than one-half the space of the width of the openings in the seating, and it was found that in valves of large diameter, by increasing the number of openings, the height of lifting, in opening, could be further reduced; the closing was necessarily more rapid, the concussion was nearly avoided, and the passage of the water was rendered direct and free from bends and interruptions. A valve on this construction was adapted to the engine at the Lambeth Water-works, and it was found, on setting it to work, that a counterbalance weight, of upwards of one ton, required to be moved from the pump side of the beam, to some distance on the steam piston side; the saving of steam consequent on this and the action of the valve, amounted to about 7 per cent. of the quantity previously used. The same effect was observed at the Chelsea Water-works, where similar valves were substituted for those of Messrs. Harvey and West.

It is stated, that in consequence of the galvanic action between the brass rings and the iron seatings, wood seatings were adopted, and have been found very preferable. The dimensions of all these valves are given in detail, and also of several other large valves which have been made.

The question of the proper weight of valves, in proportion to the height of the column, is then examined at great length, and the following rule is given: "The mean velocity of the water, in feet, per second, through the valve, being ascertained, one-half more is added to this velocity, and considered as the maximum velocity of the water through the valve; and the height of the head of water being found that would produce this velocity, every 1¾ inch of such height is considered equal to one ounce weight avoirdupois, acting upon each square inch of the area of the valve, against which the water impinges, in its passage to the pump barrel, allowance being made for the difference of the weight of the ring, when immersed in water, compared with its weight in the air." By this rule, it was found that a considerable weight required to be added to the valves which had been erected, and that addition rendered the concussion scarcely perceptible.

The author advocates a large area in the valve passages for the water to flow through, in order that the power of the engine may not be expended in putting the fluid in motion to fill the pump-barrel. He states, that the proper area depends on the diameter of the pump and the working velocity of the plunger; and that if the maximum velocity of the water up the suction pipe is not allowed to exceed 6 feet per second, but little advantage will, in ordinary cases, be gained by reducing that velocity; that an increase of speed is often unavoidable, but that it causes a great expenditure of power; and he quotes Mr. Wicksteed's experiments in support of this position. He urges from this, the importance of reducing the velocity of the water in entering and in quitting the pump barrel; and also that the lift of the valve should not exceed 2 inches, and should be as much less as possible, as the valve, in that case, closes quickly before the return stroke of the engine commences. Short lifts are then examined, and it is stated that the valves will not close rapidly, unless they are weighted sufficiently to resist the maximum velocity of the water flowing through them, and are carefully adjusted to it; and that if they are too heavy there is a loss of power in working the pumps.

Several modifications of these valves, adapted to various uses, are then described, and the author states that his intention is, to lay before the Institution an account of such valves as had been found to answer well in practice; and to direct attention to the correct principles for constructing them of proper proportions, and of durable materials.

Mr. Simpson corroborated the account of the advantages of the valves described in the paper; he had found them practically useful and economical.

Mr. Wicksteed said, that with Messrs. Harvey and West's improvements, a valve 4 feet in diameter, which formerly rose between 4 inches and 5 inches, now only lifted 1¼ inch; the concussion was diminished and the durability insured; the latter was increased by substituting wooden faces for metal ones; by this means also the corrosion, attendant upon the contact of two metals, was avoided. One of these valves had already lasted three years, and was still quite good. The principal improvement consisted in making the water pass all round the circumference, instead of through the centre of the valve. The difficulties which had been experienced at Old Ford had not arisen from the form of the valves, but from the situation in which they were placed; he argued, therefore, that when experiments were made upon these valves, new boxes and suction pipes should be made expressly for them, and they ought not to be adapted to the pipes from whence the old-shaped valves had been taken. He approved particularly of the form of the double-beat valves, as possessing great strength, and reducing the liability to fracture.

Mr. Taylor said, that the meeting was much indebted to the author, for laying down positive rules and principles, on a subject which had not hitherto been sufficiently attended to. He fully approved of those forms of valves in which the area was divided into several openings; the loading the valve proportionably was also of importance. All the ring valves, among which he would include that of Mr. Hosking, tended to diminish the concussion; but however good they might appear theoretically, there were some practical objections against most of them: for instance, Harvey and West's valve was not applicable for mines, because, as the two lifting faces were connected, a chip or any sand being interposed between either of them would cause considerable leakage in both; the ring valves were not liable to this objection, and therefore were preferable for mines or situations where the water contained any foreign substances. The old butterfly leather valve had been much improved, and recently a modification of it had been introduced, which promised to be very effective. The area of the valve was divided into eight compartments, each covered by a triangular flap of leather, hinged to the circumference of the bucket, and all meeting in the centre on a raised apex. By this arrangement nearly the whole area of the pump-valve was opened; the cost of construction was also diminished, because, instead of cutting the large flaps only out of the finest and largest hides of leather, small pieces could be used: valves thus constructed, had been in use in mines for upwards of seven months, without repair.

The improvements in the valves had produced a corresponding increase in the height of the column of the pumps; it formerly was about 15 fathoms; Woolf had gradually increased it to 40 fathoms; and now a column of 50 fathoms was sometimes used.

He was an advocate for giving a very large area to the suction-pipes; for instance, in one mine under his direction, to a valve 20 inches in diameter, two suction-pipes, each of 20 inches diameter, had been adopted, with great advantage to the engine; the pump drew more water and worked much more steadily.

Mr. Parkes remarked, that the concussion arising from the closing of the valves of low-lift pumps, was more destructive than in the high-lifts; an entirely different system was therefore pursued in pumping. The engine started very rapidly, and was generally worked much faster, which altered the condition of the pumping. At the engine of the Waldersea drainage, near Wisbeach, there was a pump of 6 feet diameter, with a length of stroke of 8 feet; the valves were formerly destroyed more rapidly than in any mine in Cornwall; recently, Mr. Hosking had adapted to it a large box, having in the centre a valve of 30 inches diameter, and around it five other valves, the sum of the area of the six valves being greater than that of the pump: the result was a great diminution of concussion, and consequently increased durability of the valves.

Mr. Glynn agreed with Mr. Taylor, in thinking that Messrs. Harvey and West's valves were not so well adapted for mining purposes as they were for water-works, or for situations where only clean water was passed through them. Mr. Darlington had introduced a modification of the valve, which he thought would be very efficacious; it was being constructed by the Butterley Iron Company, and he would send a description of it to the Institution.

The principle of large valves had been extended to blast engines; the size of the air-valves having been much increased, a corresponding advantage had been found in their duration, as well as in the work of the engine.

June 27th, 1843.

The President in the Chair.

"A model and drawing of a Lock-meter, used in Lombardy, for measuring Water for Irrigation," were presented by Benedetto Albano, M. Inst. C. E.

The author stated that the necessity for regulating the supply of water for irrigation, had induced the adoption in Lombardy of a meter, with an aperture of given dimensions, as a standard for the emission of water to the irrigating channels,—this was termed the "bocche magistrale." This standard was called "oncia d'acqua magistrale," by which was understood, a quantity of water flowing through a given aperture, under an unvarying pressure, permitting only the passage of a certain quantity per minute. This "oncia d'acqua" has now been decided by Krenzlin to be equal to 2·12 cubic metres per minute, and is now the received authority; and the system is adopted throughout Italy.

The structure consists of an aperture, where the water is measured, leading to which is the channel, having a floor inclined to the supplying stream, at an angle of 1 in 15; this channel is covered by a horizontal close boarding or ceiling, by which the undulatory motion of the water is checked, and any air is prevented from getting into the channel, while the height of the head is restricted to 4 inches above the aperture. At the end is a sluice-gate of the same width as the aperture, to be raised by a rack; on the gate is a block to prevent its being raised too high, and a bolt and lock secure it. The discharge channel is about 18 feet long, is inclined 1 in 108, and widens about 4 inches at each side, diverging outwards nearly 6 inches in the entire length.

The sluice-gate being opened sufficiently to fill the covered channel up to the ceiling, the quantity of water flowing through the aperture is accurately measured.

"On the present State of the Streets of the Metropolis, and the importance of their amelioration." By Charles Cochrane, President of the Association for the promotion of improved Street Paving, &c.

This paper first refers to a Commission formed by the present Government, "for inquiring into and considering the most effectual means of improving the Metropolis, and of providing increased facilities of communication therein;" also to a Report of a Committee of the House of Commons, which recommends "that an institution should be formed expressly for ascertaining, by a succession of experiments, the best mode of constructing roads and keeping them in repair."

A brief history of the different kinds of carriage-ways and foot-pavements is then given, shewing that the resources of art and science have been but little consulted in their construction, which is illustrated by the system of making macadamized roads, their formation being nearly dependent on the amount of traffic upon them. It is also stated that few, if any, improvements have been made in the method of forming granite pavements; the system practised twenty years since being nearly the same as at present, which is, to imbed the stones in the earth by means of mere manual strength, although, of late years, the aid of grouting has been occasionally brought into use. That in foot-pavements the same fault is perceptible, namely, the want of a good foundation, as the masons generally seem to think, that so long as the edges of the flags are well covered with mortar, and the work when completed presents an uniform surface, the chief objects are accomplished.

It is stated that wood paving, of which 100,000 yards have been laid down in the metropolis, appears likely, from the successful trials which it has undergone, to be generally adopted, the only objection against it being, that it is slippery in wet weather: this evil is chiefly attributed to the mud which is brought from the other kinds of paving, and allowed to remain on it. In all other respects, wood appears a superior material to any other hitherto employed for making roads, both as regards its general economy and durability, as well as its facility of traction, and more especially its extreme cleanliness.

The question of cleansing streets is then entered upon, when it is shown that the oftener streets are cleansed, the less mud is created, whilst the attendant expenses are not increased, and the roads are kept in better preservation. From calculations made by the municipal authorities at Manchester, on the relative advantages of machinery and manual labour in cleansing the streets, the results of which are given in a table, it is shewn that the extent of surface swept is the same, although not the extent of streets, arising from the more or less frequency of sweeping over the same surface; so that by cleansing the streets with Whitworth's street-sweeping machine three times a week, the quantity of mud produced on the surface is five times less than when they were swept by hand twice in three weeks, and thirteen times less than when swept but once a week.

	Number of Yards swept.	Number of Loads removed.	Average Number of Yards swept to produce a Load.
District swept by machine three times per week......................	5,500,000	1,285	4,338
By manual labour:			
Twice in 3 weeks, township, 1841-2	5,500,000	6,400	859
Once a week „ 1838-9	5,500,000	17,000	343

Some suggestions are given for improving, repairing, and cleansing the streets, and it is stated that there are abundant means at present available, for keeping them comparatively free from mud, if machinery was properly employed.

"On the relative merits of Granite and Wood Pavements, and Macadamized Roads; derived from actual experience." By D. T. Hope (Liverpool).

In this communication the author alludes to the inefficiency of many of our finest specimens of paving, arising from the desire of reducing the outlay, but which, in reality, are executed and maintained at a great expenditure, without securing the advantages which the material is capable of affording, or the qualifications requisite for streets:—and to the cleanliness, comfort, and true economy, in having the work performed in the best manner, and employing material best calculated for producing all those advantages, which may be reasonably expected in streets of the present day.

The following requisites that a good road or pavement ought, in some degree, to possess, are laid down as a standard, by which the respective systems are compared; and a certain value (according to the experiments on the several modes) attached to each, for the convenience of more obviously contrasting their several qualities; viz.,

1. A solid and compact structure, capable of resisting the ef-

fects of traffic, without being cut up into ruts and inequalities from other causes than mere abrasion.

2. Not requiring to be frequently repaired.

3. As much elasticity in the material, as may be useful in aiding the power in draught.

4. A firm and smooth surface, that the power employed may not require to be ever varying.

5. Although comparatively smooth, to be free from slipperiness.

6. To afford a sure foot-hold for the horse.

7. Not liable to be seriously affected by the changes of the atmosphere, or by repairs.

8. An absence of mud and dust.

9. A freedom from noise.

10. To afford economy in transit.

11. An economy in the construction and maintenance, consistent with the preceding advantages.

12. Not subject to rapid abrasion.

It is shown that macadamizing has few, if any, advantages for public thoroughfares, arising from its rapid abrasion; the frequent application of new metal; the uncertainty of its condition, varying with every change of weather; the abundance of mud and dust, and the great expense of maintenance; and from the power employed in draught requiring to be so variable, that the cost of transit is not only increased, but the horse is often compelled to exert more power at one time or in one part of the street, than should ever be required of it. And also, that the advantages which may be claimed for macadamizing in streets, are attainable in other descriptions of paving, if proper attention be paid to their construction.

It is contended, from experience, that granite pavement can be laid down, so that the results will be superior to macadamizing, not only as regards economy of construction and maintenance, and power in draught, but also of the other qualities, with the single exception of noise, which, it is shewn, need not be so great a disadvantage as to warrant its rejection. If the sets be well dressed, and properly laid, on a sufficient substratum, and if the sets are not used too broad, a sure foot-hold for the horse can at all times be had, besides contributing more to the solidity of structure, than the broad and shallow blocks so frequently employed.

By experiment, it appears that wood is a more efficient and durable material for paving than stone of any description, and that it is capable of affording all the qualities required for our finest streets. In order to ascertain the best position of the fibre, for securing all the advantages which wood can afford, a minute table is given of the results of experiments, during a period of eighteen months, upon blocks with the fibre placed vertically and horizontally, and leaning at the intermediate angles; from this it appears that vertical blocks sustain less abrasion and less injury than those in any other position. A sound concrete substratum is held to be an essential feature, in the successful application of wood for paving; and if blocks in a vertical position be laid down in a dry state, with close joints, the surface and structure can be maintained, under any change of weather, in a condition to resist any amount of traffic and heavy loads. It is shown that cohesion is not a fluctuating quality, for the blocks in the pavement are, in reality, not liable to become wet and dry with atmospheric changes. In wet weather they absorb as much moisture as they can obtain, which increases their volume, and from which moisture they are never after totally free, even in the driest weather, as they still remain damp, and retain an excess of volume over the dry state in which they were originally laid down, more than sufficient for supplying perfect cohesion under any change of the atmosphere. It it also shown that wood does not produce mud and dust, and that slipperiness is therefore foreign to wood pavement; that its economy in maintenance, power in draught, cleanliness and comfort, are favorable recommendations;—and that wood is an efficient material for paving, whether subjected to wet, dry, or frosty weather.

Tables are then given, shewing the results of the experiments in a condensed form, from which it appears, that, the power of traction being in each 100 lbs., the weight drawn on a level macadamized road, is on the average 27 cwts.; on a level granite pavement, 30½ cwts.; and on a level wood pavement 54¾ cwts.

"On the Ventilation of Lighthouse Lamps; the points necessary to be observed, and the manner in which these have been or may be attained." By Professor Faraday, LL.D., Hon. Mem. Inst. C.E., &c.

The author states that the fuel used in lighthouses for the production of light is almost universally oil, burnt in lamps of the Argand or Fresnel construction; and, from the nature and use of the building, it very often happens that a large quantity of oil is burnt in a short time, in a small chamber exposed to low temperature from without, the principal walls of the chamber being only the glass through which the light shines; and that these chambers being in very exposed situations, it is essential that the air within should not be subject to winds or partial draughts, which might interfere with the steady burning of the lamps.

If the chamber or lantern be not perfectly ventilated, the substances produced by combustion are diffused through the air, so that in winter, or damp weather, the water condenses on the cold glass windows, which, if the light be a fixed one, greatly impairs its brilliancy and efficiency, or, if the light be a revolving one, tends to confound the bright and dark periods together. The extent to which this may go, may be conceived, when it is considered that some lighthouses burn as much as twenty, or more, pints of oil in one winter's night, in a space of 12 or 14 feet diameter, and from 8 to 10 feet high, and that each pint of oil produces more than a pint of water; or from this fact,—that the ice on the glass within, derived from this source, has been found in some instances an eighth, and even a sixth, of an inch in thickness, and required to be scraped off with knives.

The carbonic acid makes the air unwholesome, but it is easily removed by an arrangement which carries off the water as vapour. One pound of oil in combustion produces about 1·06 pounds of water and 2·86 pounds of carbonic acid.

The author's plan is to ventilate the lamps themselves by fit flues, and then the air inside the lantern will always be as pure as the external air, yet having closed doors and windows, a calm lantern, and a bright glass.

In lighthouses there are certain conditions, to which the ventilating arrangement must itself submit, and if these are not conformed with, the plan would be discarded, however perfect its own particular effect might be. These conditions are chiefly, that it should not alter the burning of the oil or charring of the wicks,—that it should not interfere with the cleaning, trimming, and practice of the lamps and reflectors,—that it should not obstruct the light from the reflectors,—that it should not, in any sudden gust or tempest, cause a downward blast or impulse on the flame of the lamp,—that, if thrown out of action suddenly, it should not alter the burning; and, added to these, that it should perform its own ventilating functions perfectly.

Lighthouses have either one large central lamp, the outer wick of which is sometimes 3¾ inches in diameter, or many single Argand burners, each with its own parabolic reflector. The former is a fixed lamp; the latter are frequently in motion. The former requires the simplest ventilating system, and is thus described:—

The ventilating pipe or chimney is a copper tube, 4 inches in diameter, not, however, in one length, but divided into three or four pieces: the lower end of each of these pieces, for about 1½ inch, is opened out into a conical form, about 5½ inches in diameter at the lowest part. When the chimney is put together, the upper end of the bottom piece is inserted about ½ an inch into the cone of the next piece above, and fixed there by three ties or pins, so that the two pieces are firmly held together; but there is still plenty of airway, or entrance into the chimney between them. The same arrangement holds good with each succeeding piece. When the ventilating chimney is fixed in its place, it is adjusted, so that the lamp-chimney enters about ½ an inch into the lower cone, and the top of the ventilating chimney enters into the cowl or head of the lantern.

With this arrangement, it is found that the action of the ventilating flue, is to carry up every portion of the products of combustion into the cowl; none passes by the cone apertures, out of the flue into the air of the lantern, but a portion of the air passes from the lantern by these apertures into the flue, and so the lantern itself is in some degree ventilated.

The important use of these cone apertures is, that when a sudden gust, or eddy of wind, strikes into the cowl of the lantern, it should not have any effect in disturbing or altering the flame. It is found that the wind may blow suddenly in at the cowl, and the effect never reaches the lamp. The upper, or the second, or the third, or even the fourth portion of the ventilating flue might be entirely closed, yet without altering the flame. The cone junctions in no way interfere with the tube in carrying up all the products of combustion; but if any downward current occurs, they dispose of the whole of it into the room, without ever affecting the lamp. The ventilating flue is, in fact, a tube which, as regards the lamp, can carry every thing *up*, but conveys nothing *down*.

In lighthouses with many separate lamps and reflectors, the case is more difficult, and the arrangement more complicated; yet the conditions before referred to are more imperatively called for, because any departure from them was found to have greater influence in producing harm. The object has been attained thus:—A system of gathering pipes has been applied to the lamps, which may be considered as having the different beginnings at each lamp, and being fixed to the frame which supports the lamps, is made to converge together and to the axis of the frame by curved lines. The object is to bring the tubes together behind the reflectors, as soon as convenient, joining two or more into one, like a system of veins, so that one ventilating flue may at last carry off the whole of the lamp products. It is found that a pipe $\frac{7}{8}$ths of an inch in diameter is large enough for one lamp; and where, by junction, two or more pipes have become one, if the one pipe has a sectional area, proportionate to the number of lamps which it governs, the desired effect is obtained.

Each of the pipes $\frac{7}{8}$ths of an inch in diameter, passes downwards through the aperture in the reflector over the lamp, and dips an inch into the lamp glasses; it is able to gather and carry off all the products of combustion, though, perhaps, still 2 inches from the top of the flame, and therefore not interfering in any respect with it, nor coming as a shade between it and any part of the reflector: the flame and reflector are as free in their relation to each other as they were before. Neither does this tube hide from the observer or mariner, a part of the reflector larger than about $1\frac{1}{4}$ square inch of surface, and it allows of a compensation to two or three times the amount; for, when in its place, all the rest of the aperture over the lamp, which is left open and inefficient in the ordinary service, may be made effectual reflecting surface, simply by filling it up with a loose, fitly formed reflecting plate.

At this termination of the ventilating flue an important adjustment is effected. If the tube dip about an inch into the lamp-glass, the draught up it is such that not only do all the products of combustion enter the tube, but air passes down between the top edge of the lamp-glass and the tube, going, finally, up the latter with the smoke. In this case, however, an evil is produced, for the wick is charred too rapidly; but if the ventilating flue descends until only level with the top of the lamp-glass, the whole of the burnt air does not usually go up it, but some passes out into the chamber, and at such times the charring of the wick is not hastened. Here, therefore, there is an adjusting power, and it was found by the trials made, that when the tube dipped about ⅛ an inch into the lamp-glass, it left the burning of the lamp unaltered, and yet carried off all the products of combustion.

The power, already referred to, of dividing a chimney into separate and independent parts, and yet enabling it to act perfectly as a whole, as shewn in the single central chimney, was easily applicable in the case of several lamps, and gave a double advantage; for it not only protected the lamps from any influence of down draught, but it easily admitted of the rotation of the system of gathering flues, fixed to the frame sustaining the lamps and reflectors in a revolving lighthouse, and of the delivery of the burnt air, &c., from its upper extremity into the upper immovable portion of the flue. This capability in a revolving light is essential, for, in all, the support of the frame-work is of such a nature, as to require that the upper part of the flue should be a fixture.

"On the Pressure and Density of Steam, with a proposed new formula for the relation between them; applicable particularly to Engines working with high-pressure Steam expansively."

By William Pole, Assoc.Inst.C.E.

The relations between the elasticity, temperature, and density of steam have long been interesting and important subjects of philosophical research.

The connexion of the two former, namely, pressure and temperature, with each other, has excited the greatest attention, numerous experiments having been undertaken to ascertain the values of them at all points of the scale, and many formulæ proposed by English and foreign mathematicians, to express approximately the relation between them.

The pressure and temperature being known, the density, or what answers the same purpose, the relative volume, compared with the water which has produced it, may be deduced by a combination of the laws of Boyle* and Gay Lussac†; and may be expressed algebraically in terms of the pressure and temperature combined; whence, by eliminating the latter, by means of the before-mentioned formulæ, expressions can be arrived at which will connect at once the volume with the pressure.

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* That "if the temperature remain constant, the density varies directly as the pressure."

† That "if the pressure remain constant, and the temperature change, the volume receives a certain definite amount of augmentation, for each degree

But there are several difficulties in the way of this process, the equations which may be thus obtained being too complicated for practical use; and therefore, since it is important in calculations connected with steam and the steam-engine, to find a tolerably accurate, and at the same time, simple rule, which shall give the pressure and volume directly in terms of each other, the empirical method has been resorted to.

The paper enumerates three formulæ given for this purpose by M. Navier and M. de Pambour, explaining the peculiar cases to which they are applicable, and those in which they fail; and the author then proposes a fourth expression, which is intended to meet a case not provided for by either of the others, namely, for "condensing engines working with high-pressure steam expansively;" such as the Cornish, and Woolf's double-cylinder engine. The equation is,—

$$P = \frac{24250}{V - 65},$$

$$\text{or reciprocally, } V = \frac{24250}{P} + 65.$$

P being the total pressure of the steam in lbs. per square inch, and V its relative volume, compared with that of its constituent water.

These formulæ may be adopted without considerable error, throughout the range generally required in such engines, viz., from about 5 lbs. to 65 lbs. per square inch.

Two tables are then given, showing the pressures and volumes as calculated for every 5 lbs. pressure in this scale; they shew a comparison of the results of the four formulæ with each other, and the respective amount of deviation from truth in each.

The greatest error is,—

	lbs.	
By M. Navier's formula	1·31	per square inch.
M. de Pambour's first ditto	4·12	„
„ „ second ditto	2·75	„
The new formula	0·71	„

The mean error is,—

By M. Navier's formula	0·245	per square inch.
M. de Pambour's first ditto	1·42	„
„ „ second ditto	0·35	„
The new formula	0·0062	„

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of temperature added, or *vice versâ.* This augmentation is = ·00208 of the volume at the freezing point, for each degree of Fahrenheit, or ·00375 for each degree Centigrade.

The tables also show :—

1st. That the new formula is nearer the truth than either of he others taken separately, in three-fourths of the scale.

2nd. That it is nearer than all three combined, in half the scale.

3rd. That the greatest error of the new formula, with regard to the pressures, is only about half as great as that of the most correct of the other three.

4th. That the mean error is only one-fortieth of either of the others, and only equal to about one-tenth of an ounce per square inch.

5th. That the errors in the volumes are much less numerous and important with the new formula than with either of the others.

It is also added, that the new expression is simpler in algebraical form than the others; it is more easily calculated, the constants are easier to remember, and that no alteration of the constants in the other formulæ will make them coincide so nearly with the truth as the new one does.

The Meeting of the Institution was then adjourned to the second Tuesday in January, 1844.

ON THE LAWS RELATING TO LETTERS PATENT FOR INVENTIONS.

No. XIII.

THE PATENT LAWS OF HANOVER.

The kingdom of Hanover is one of the few states of Germany which have not, as yet, thought it expedient to join the German Customs' Union, or *Zollverein;* and, therefore, the general rules and regulations lately promulgated and agreed to by the several states, which form the Confederation (an extract from which general rules we gave in our last, in connection with the Patent Laws of Saxony), have no power in Hanover; and although patents are sometimes granted in this country for meritorious inventions, there is not any fundamental law at present established relating to the granting of patents for inventions. The following instructions, however, have been issued by the Hanoverian Government, for the information of inventors, as the general principles hitherto adhered to in these matters.

Art. 1. Patents for inventions *(Erfindungs-Patente)*, and patents of introduction or importation *(Einführungs-Patente)*, are granted as follows:—The former to the author of any invention in the arts, manufactures, or science; the latter to any person desirous of introducing a foreign invention, hitherto unknown in this kingdom.

Art. 2. The petition, soliciting the grant of a patent, must be sent into the office of the Ministry of the Interior, and must comprise an exact and complete description of the article for which the patent is sought, accompanied by such drawings and models as may be requisite for the clear and perfect understanding of the same.

Art. 3. The Minister of the Interior causes the petition, and other documents accompanying the same, to undergo an examination by persons competent to decide upon the merits of the invention; and it depends upon the results of that examination whether the petition is immediately rejected, or transmitted to His Majesty for the purpose of obtaining the grant of a patent.

Art. 4. As a general rule, patents are granted for the term of five years only. Patents for the introduction of a foreign invention, however, are sometimes permitted to continue in operation until the expiration of the foreign patent, but cannot, on any account, be extended beyond that time.

Art. 5. Foreigners may obtain the grant of a patent, on condition that the invention in question shall be brought into effective operation within a certain specified time, which will be mentioned in the patent, if the same is granted.

Art. 6. The patent, so long as it remains in force, guarantees to the patentee the exclusive right of carrying into effect the invention thereby protected; subject, however, to certain restrictions, as to trading in the articles which are manufactured under the protection of the said patent.

Art. 7. The patent, or the exclusive right thereby acquired, may be transferred, sold, or assigned, by the original patentee, to any other person or persons.

Art. 8. All infringements upon the exclusive rights conferred by a patent, subject the offender, by law, to the forfeiture or confiscation of the illegally manufactured article or articles; and also to the repayment (*Resp*) of all profits derived from the sale of such articles, if any should have been sold; and, in addition, a fine, varying in amount according to circumstances, may also in some cases be inflicted.

Art. 9. The patent will be annulled or rescinded, if it should appear, that, at the time the grant was made, the invention was not new; if the invention should be insufficiently, ambiguously, or incorrectly described; or if it should be proved by any other person that he was the real author of the invention in question, and that the patentee had fraudulently obtained and appropriated the same to his own use and benefit.

Hanover, Nov. 1843.

Scientific Adjudication.

EXCHEQUER CHAMBER.

Nov. 27th, 1843.

Before Chief Justice Tindal, Justices Maule and Erskine, and Barons Alderson, Gurney, and Rolfe.

COOK *v.* PEARCE & ANOTHER.*

THE Attorney-General (Sir F. Pollock) and Mr. Hoggins were for the plaintiff, and Mr. Erle and Mr. H. Hill for the defendants.

This case was for infringing the plaintiff's patent for "improvements in carriages."

The defendants pleaded, first, that they were not guilty; secondly, that the plaintiff was not the true and first inventor; thirdly, that the said invention was not new; fourthly, that the plaintiff did not, by an instrument in writing, particularly describe the nature of his invention; fifthly, that the said invention was not an improvement in carriages, nor of any public benefit or advantage; sixthly (after setting out the specification), that although the said alleged invention, in the declaration and letters patent respectively mentioned, is therein styled and described as "improvements in carriages," yet the said invention, in truth and in fact, is not an invention of improvements in carriages generally, but of certain alleged improvements in the fixing and adapting German shutters in those carriages only in which German shutters are used; and that German shutters cannot be used in divers and very many carriages, to wit, coaches, chariots, and other covered carriages of the like kind; and so the defendants say that the title of the said invention is too large and general, and, by reason thereof, the said letters patent are void, and of no force; concluding with a verification.

The plaintiff replied by taking issue on the first, second, and fourth pleas, traversing the third and fifth; and pleading to the sixth, that the invention was an invention of "improvements in carriages" *modo et formâ.*

The defendants joined issue on the replication to the latter pleas.

At the trial before Justice Wightman, at the sittings after Hilary Term, 1842, the following special verdict was found upon the respective issues: upon the first, for the plaintiff; upon the second, that the use of German shutters to carriages, folded in three folds, in the manner described in the specification, as far as the folding was concerned, was public and common before the date of the patent, but that the plaintiff was the true and first inventor of the mode of combining the parts as described in the specification, and applying them to carriages for facilitating the moving or working of German shutters by springs, in manner and form, &c.; upon the third, fourth, and fifth, that the use of German shutters to carriages, folded in three folds, in the manner described in the specification, so far as the folding was concerned, was public and common before the date of the patent; but that, except as to such folding, the said invention, in the said patent mentioned, was, at the date thereof, a new invention, as to the public use and exercise thereof; and that the plaintiff did, by an instrument in writing, under his hand and seal, particularly describe the nature of his said invention, and in what manner the same was to be performed, so as to enable a workman of ordinary skill to carry the invention into effect, and apply it to all carriages to which it is applicable; and that the said invention was an improvement to all those carriages to which it was applicable, and was of public benefit and advantage; but that there were several descriptions of carriages to which it was not applicable, such as coaches and chariots; and upon the sixth, that the said invention, in the declaration and letters patent respectively mentioned, was not an invention of improvements in carriages generally, but of certain improvements in the fixing and adapting German shutters in those carriages only in which German shutters are used; and that German shutters cannot be used in divers and very many carriages, to wit, coaches, chariots, and other covered carriages of the like kind.

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* Our own notes of this important case not being, in our opinion, sufficiently copious, we have made some extracts from the very able report which appeared in our contemporary the *Law Times.*

This special verdict was argued before the Court of Queen's Bench, on the 18th November, 1842, and 2nd February, 1843; and the Court, after taking time to consider, gave judgment for the defendants on the sixth plea. Upon that judgment the present writ of error was brought.

The plaintiff, it appears, in the interim, lodged a Memorandum of Alteration with the Clerk of the Patents (dated 5th April, 1843), wherein he adds to his previous title of "improvements in carriages," the following words,—"wherein German shutters are used, as to the mode of moving and working such German shutters," so that the title will now read, "improvements in carriages wherein German shutters are used, as to the mode of moving and working such German shutters:" but this in no wise affects the present action.

The Attorney-General said, The question raised, is, whether a patent is void which professes to be an improvement in a certain class of things having one common name, unless it be an actual improvement in every one of that class. I submit it is no objection that the improvement is applicable to only one of that class. *Fisher* v. *Dewick*, is a direct authority that it is not necessary that the title of the patent should distinctly point out to what class it belongs, provided it is fairly applicable to the subject-matter of the specification. The proposition I mean to make out, is, that if the patent is fairly taken out with any title the Crown chooses to give, which fairly indicates the nature of the invention, it is good, except on the ground of fraud, and can only be repealed by a *scire facias*. Suppose an improvement in mills for grinding corn,—that may mean an improvement in mills worked by horses, or steam, or wind; so an improvement in the making of candles may apply to mould candles and not to dips.

It is for the Crown to consider on what terms it will grant a particular monopoly, and, in so doing, it is always taken into consideration that the title and specification are to be read together. In *Sturtz* v. *De la Rue* the patent was for an improvement in a particular part of a certain process, and the title was "for certain improvements in copper and other plate printing." There the Lord Chancellor says, "The description in the patent must unquestionably give some idea, and, so far as it goes, a true idea, of the alleged invention, though the specification may be brought in aid to explain it. The title in this patent is 'for certain improvements in copper and other plate printing.' Copper-plate printing consists of processes involving a great variety of circumstances; the paper must be of a particular description; before it is used, it must be damped; it must remain damp a certain time, and must be placed in a certain temperature; the plate must be duly prepared, and duly applied, and various processes must be gone through before the impression is drawn off, and brought to a finished state. *An improvement in any one of those circumstances*—in the preparation of the paper, for instance, or the damping of it, &c.—may truly be called *an improvement in copper-plate printing*." There the Court held, that if, connecting the title with the specification, the public had all the information that could reasonably be expected, and were not misled, it was sufficient. In *The King* v. *Wheeler*, the title was for "a new or improved method of drying and preparing malt." The Court considered the invention mentioned in the specification entirely different from that mentioned in the patent, and decided the case upon a point wholly beside the present question. *Fisher* v. *Dewick* was a case before Justice Coltman, in which Sir Thomas Wilde was for the plaintiff, and Lord Campbell for the defendant: the patent was for "an improvement in the machinery for the manufacture of bobbin net lace." On the trial it was objected, by the counsel for the defendant, that there was a misdescription of the invention. The invention was merely for the purpose, in a particular part of the process, of making a spot, and the only improvement was, that it enabled the manufacturer, while the work was going on, to make the spot in it. It was objected that it ought to have been described as a mode of making the spots, because it was useless except in those cases where the spot was wanted; that was over-ruled, on the ground that it *was* applicable to the mode of making bobbin net. Upon a motion for a new trial, Chief Justice Tindal said, on the first ground of objection taken at the trial, "On the best consideration I can give to the question, I think the objection fails. That objection is, that the specification, when examined, does not agree with the title of the patent; that is, a patent for the improvement in the machinery for the manufacture of bobbin net lace. It is more properly a machine for putting on spots or ornaments, than for making bobbin net lace; but it appears that when the fabric is exported, it is still called bobbin net lace, and, therefore, without a very great refinement in language, I think it is an improvement in the manufacture of bobbin net lace; and the rule was refused. So here it is not necessary that the title, in its generality, should be understood to mean *all* carriages; it is not for carriages generally, but only of a certain sort. In *Cochrane* v. *Smethurst* the patent was granted for "a method or methods of more completely lighting cities, towns, and villages;" but that turned out to be no more than an improvement on the old argand lamp. It was contended that the specification was not too large, but Justice Le Blanc said, "I think the patent cannot be supported: it is, in substance, a patent for an improvement in street lamps, and should have been so taken;" and the plaintiff was accordingly nonsuited. The ground of that judgment must have been, because it misled the public, and was a sort of fraud upon them.

Baron Alderson.—It is a question whether the true objection in *Cochrane* v. *Smethurst* was not that the title was too small, because the specification included the lighting of houses. It might just as well have been called an improvement in using glass, because glass was used in lamps, and lamps in lighting streets. If it had been fit for shops and houses, it would been bad, because the improvement was applicable to shops and houses, and the title stated it to be only for cities.

The Attorney-General in continuation said, In *Jessop*'s case, the patent was held to be void, because the specification was for an improvement on the whole watch, and the improvement was only for a particular part. In that case Justice Buller, after citing the case of *Morris* v. *Branson*, where the patent was for making eyelet-holes, or net-work, in silk, thread, cotton, or worsted, and the defendant objected that it was not a new invention, it being only an addition to the old stocking-frame, goes on to say—"We may safely collect that he (Lord Mansfield) thought, on great consideration, the patent was good. Since that time, it has been the generally received opinion of Westminster Hall, that a patent for an *addition* is good." In *Bovill* v. *Moore* the question resolves itself into one of fact. In *Hornblower and Maberley* v. *Boulton and Watt*, Justice Grove says—"The benefit to the public is from the specification disclosing to the world how others may make and use the same manufacture; without the specification, the public have not that information; and, by the condition of the letters patent, without the specification the patentee is not entitled to his monopoly. Providing, therefore, by the patent, that there must be a specification, and there being necessarily one, in consequence of that proviso, I consider the patent and specification so connected together as to make a part of each other; and that to learn what the patent is, I may read the specification, and consider it as incorporated in the patent."

Baron Alderson.—Suppose he had taken out a patent for an improvement in windows, would it have been good? According to your argument, it might both be described as an improvement in carriages and an improvement in windows.

Baron Gurney.—The more likely way of putting it is, that it is not an improvement in carriages, but in a very modern appendage to some carriages.

The Attorney-General.—Provided the patentee, when he applies for the patent, calls the attention of the public to the subjec-matter of it, it is sufficient whether the improvement be in a part or in the whole of the carriage. If it could be proved that it was intentionally so vague as to deceive the public, that might alter the case.

Mr. Erle, for the defendants, said, I submit that the judgment ought to be affirmed. In *Fisher* v. *Dewick*, the matter was much discussed, and it was there decided that the title ought to contain a reasonable description of the invention. Patents were granted for many years, without the Crown requiring a specification at all, and, since their introduction, it has always been held that the language of the specification must coincide with the title. A party taking out this as a patent for an improvement in carriages must have intended to draw off the attention of the public, for it had nothing to do with carriages in general, but related only to that particular class of carriages which have moveable heads: what parties generally do by hand, the plaintiff does by a spring. The specification states, that the invention consists of a mode of constructing and applying certain apparatus to such carriages and German shutters, to facilitate the working and moving of such shutters. A party would have his attention directed to quite a different thing to what is stated in the title. An improvement in steam-engines would not do, and what could be more absurd than an improvement in ships, or in guns. Would it be reasonable for a man having an invention in *shot*, to state it as an improvement in guns?

Justice Maule.—You say the description of the patent should be such as to afford reasonable warning to all parties. Do you mean to all parties whatever, or to artists only? Is not that matter of fact which must appear by averment, and does not appear here, and should it not have been averred in the plea? The plea would be proved by shewing such an invention as would be applicable to every species of carriages, except Shillibeer's hearses.

Mr. Erle.—The plea sets out the specification, and I take it that the Court is bound to know the meaning of the expressions "carriages" and "German shutters." Suppose the patent for an improvement in anchors, if the invention was in the fluke of the anchor, it would not be necessary to find that an anchor is only used when the ship is brought up; but in the present case, the plea states that it is not an improvement generally, but only in the moving and fixing of German shutters in those carriages in which German shutters are used, and that there are several descriptions of carriages in which they are not used. But I submit that this general title makes the patent void; and that the decision of Lord Lyndhurst, in *Sturtz* v. *De la Rue,* does not conflict with that principle. In *Rex* v. *Wheeler,* the Court said they considered the language of the specification as the language of the patentee himself. The case of *Cochrane* v. *Smethurst* is in point for the defendants; there the title was too vague; and *Jessop*'s case is in my favour, because there the patent was for an improvement in watches, and the specification only claimed one particular part.

The Attorney-General, in reply, said, The question is, whether a patent which is taken out for an improvement in carriages is bad, if it is not an improvement in all carriages. I submit that it is not, because an improvement in some carriages is still an improvement in carriages. What is a reasonably precise description is a question of fact in each particular case, and in *Lord Cochrane*'s case the specification was so described for the purpose of misleading the public: but that is not so here, and therefore the plaintiff is entitled to the judgment of the Court.

JUDGMENT.

1st Feb. 1844.—Chief Justice Tindal, in delivering judgment, said, This was an action on the case, brought against the defendant for the infringement of a patent taken out by the plaintiff for an improvement in carriages; and the question raised in the court below, and in the argument in error, arises on the issue raised by the 6th plea. That is a special plea, whereby the defendant, after setting out the specification *in hæc verba,* pleads, that although the said invention is styled and described as "improvements in carriages," yet the said invention, in truth, is not an invention of improvements in carriages generally, but of certain alleged improvements in the fixing and adapting German shutters only in such carriages as use German shutters, and that they cannot be used in coaches, chariots, and other covered carriages of the like kind, and so the title is too large and general, and, by reason thereof, the said letters patent are void. To this the plaintiff has replied, that the said invention is an invention of improvements in carriages.

The jury found that the invention was not an improvement in carriages generally, but in fixing and adapting German shutters in those carriages in which German shutters are used, and therefore found the verdict for the defendant on the sixth plea; and the question below was, whether, the title being too large and general, the patent was therefore void, and of no force. The Court below gave judgment for the defendant, on the ground that it was bad for vagueness and uncertainty, and that the title of the patent being too large and general, the patent must be altogether held void. The decision does not proceed on the ground that the title must be held to claim more than is contained in the specification, for if the title had been for the invention of two things, and the specification had shewn it to be for one only out of the two, in such case it is allowed that it must be void, on the principle of *Brunton* v. *Hawkes*, viz., that there must be an entire discovery of all those things for which the patent is taken out. But such an objection does not apply to the case before the Court, because the words "improvements in carriages" do not necessarily import improvements in all carriages, but may be held to apply to some carriages only. Mere vagueness appears to us to be an objection that might be taken on the part of the Crown to the grant of the letters patent, but not after they are granted. If any fraud had appeared to have been practised on the Crown in obtaining it, the patent might be held void: but there is no evidence of design on the part of the inventor in choosing a vague title, although if such design had appeared, or if we considered that it was so chosen to prevent other subjects of the Queen from availing themselves of an invention before used by them, that might be considered as a fraud on the Crown; and upon such proof of fraud on the Crown, or injury to the subjects, we might say, that vagueness in the generality of the title might annul the patent. But in the present case there is no evidence of fraud, but the patent is held bad, merely on the ground that the title is so large as to be capable of importing a different invention from that in the specification. We think it unsafe, without farther authority, to lay down a rule so large as that laid down in the Court below, but consider that it would be doing an injury to many patents if we were to hold this void, merely because the title is in the same terms as are capable of application to some other invention than that in the specification, and that, too, without any ground of fraud. The cases principally discussed were those of *Lord Cochrane* v. *Smethurst*, and *Jessop*'s case. If the former of those cases is to be considered of any decided value in the Court above, it would be open to this observation, that the extreme generality in that case far exceeds this; but the case was not moved in the Court of Queen's Bench, and, therefore, its authority cannot be carried higher than the opinion of the judge who tried it. As to *Jessop*'s case, that differs from the present, because there the patent was taken out for a watch, to which we can attach only one precise sense; but an improvement in carriages is any thing but precise, and does not apply to any precise thing; therefore, if it had been limited to an improvement in the watch only, it would have been held not too general; but the specification claiming the invention with respect to a particular movement only, was at direct variance with the title, which was for the whole watch. We think, therefore, that, in the present case, the only objection being with respect to the vagueness, and no fraud having been suggested, enough has not been shewn to satisfy us that the title is at variance with the specification. This coincides with the opinion of the Court of Exchequer in the case of *Neilson* v. *Harford*, and although the finding of facts on the sixth issue requires the verdict to be entered for the defendant, we think that issue raises no question which discloses any answer to the plaintiff's claim, and, therefore, there must be judgment for the plaintiff *non obstante veredicto* on that issue.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

Jan. 30. *John Bruce*, of Tiddington, near Stratford-upon-Avon, for an improved skim or stubble plough.

Feb. 8. *George David Doudney*, of 17, Old Bond-street, in the Parish of St. George's, Hanover-square, Westminster, for Boon's scales.

9. *James Milne & Son*, of Edinburgh, for improved sliding tubes, or what are called water joints, for lowering or raising gas pendants.

10. *Allen & Moore*, of 131, Snow-hill, Birmingham, for a gold coin gauge and weight.

12. *Peter Robertson*, Engineer to the Glasgow and Ayr Railway Company, Glasgow, and *John Todd*, of 67, Mitchell-street, Glasgow, for a spring and axle box proper for railway and other carriages.

13. *Alexander Wilson*, of 22, Milk-street, Cheapside, for the Windsor parasol.

14. *Alexander Burton*, of 2, Norfolk-place, Laurieston, Glasgow, for a letter printing press.

19. *Alexander Stiven*, of 86, Drake-street, Rochdale, for an improved, simple, and compound parallel vice.

19. *Job Allen*, of Primrose-street, Bishopsgate-street, for a steam priming preventor.

Feb. 20. *Robert Mitchell*, of Portobello-street, Sheffield, for a screw auger with four cutters.

20. *Richard Roberts & Co.*, of the Globe Works, Manchester, for the end frame of a power loom.

20. *Benjamin Fowler*, of Dorset-street, Salisbury-square, City of London, for a hot water circulator.

20. *Thomas Wolferstan*, of Salisbury, for an improved tap or cock.

21. *Fletcher Woolley*, of 180, High Holborn, in the county of Middlesex, for a design for improvements in the shape and configuration of lamps and apparatus connected therewith, for the burning of oil of turpentine, camphine, naphtha, resinine, retinaphtha oils, and similar combustibles,—parts of which improvements are applicable to other purposes.

22. *George Forrester & Co.*, of Vauxhall Foundry, Liverpool, for a design for a wrought-iron railway wheel.

26. *James Milne & Son*, of Edinburgh, for an improvement on gas meters, preventing the possibility of their being overcharged with water, and thereby rendering it impossible that such meter can ever act to the disadvantage of the consumer.

List of Patents

Granted by the French Government from the 1st of July to the 30th of September, 1841.

PATENTS FOR FIFTEEN YEARS.

Bontemps, of Choisy le Roi, represented in Paris by M. Perpigna, Advocate, 2 ter: Rue Choiseul, for improved pistons and valves.

Dubrunfaut, of Paris, represented by M. Perpigna, for a process and means of purifying animal and vegetable oils.

Duquesne, of Valenciennes, represented by M. Perpigna, for a means of obtaining from the residue of distilled vegetable substances, a food for cattle.

Francis, of New York, represented by M. Perpigna, for a life boat.

Isaac and Dognin, of Lyons, represented by M. Perpigna, for an embroidering frame.

Osmont, of Paris, represented by M. Perpigna, for an improved gas-meter.

Rejany, of Paris, represented by M. Perpigna, for an improved steam-engine.

Sommerville Beckhaus, of Birmingham, represented by M. Perpigna, for an improved machine for manufacturing copper and brass tubes.

Sudds, Windzor, and Nicholson, of Rouen, represented by M. Perpigna, for a machine for making pins and pin nails.

Blanc, of Lyons, for improved machinery for the transmission of power, applicable to all steam engines.

Bourdier, of Paris, for an improved punch.

Buisson, of St. Servan, for improvements in the manufacture of bitumen.

Cazaux, of Eaux-Bonnes, for Eaux-Bonnes lozenges.

Dufaud and Rees, for an improved mode of fining iron.

Dutourban, of Paris, for a frame for making wire grating.

Grafton and Cambridge, for improvements in the manufacture of gas.

Griolet, of Paris, for a machine for combing wool.

Koch, of Paris, for a machine for spinning and twisting all kinds of fibrous substances.

Lesure, of Paris, for an improved kind of embroidery.

Mallet, of St. Quentin, for a means of collecting the ammoniacal gases evolved in the distillation of bones.

Martin, of Paris, for improvements in wind instruments.

Mouret, of St. Just, for an improved system of education.

Patoux, of Aniches, for a process for extending the common glass used for windows.

Penzold, of Paris, for a machine for drying tissues and other substances.

[*To be continued.*

List of Disclaimers
OF PARTS OF INVENTIONS AND
Amendments
MADE UNDER LORD BROUGHAM'S ACT.

Moses Poole,—disclaimer and memorandum of alteration to patent dated 21st March, 1837, for "improvements in making fermented liquors." Filed 30th January, 1844.

John Jeremiah Rubery, of Birmingham,—disclaimer to patent dated 14th November, 1837, for "certain improvements in the manufacture of part of the furniture of an umbrella." Filed 2nd February, 1844.

John Gibson, of Glasgow, throwster, and John Gordon Campbell, of the same place, merchant,—disclaimer and memorandum of alteration to patent dated 19th November, 1836, for "a new or improved process or manufacture of silk, and silk in combination with certain other fibrous substances." Filed 17th February, 1844.

William Palmer, of Sutton-street, Clerkenwell, lamp manufacturer,—disclaimer to patent dated 10th July, 1838, for "improvements in lamps." Filed 24th February, 1844.

List of Patents

That have passed the Great Seal of IRELAND, from the 17*th December,* 1843, *to the* 17*th of February,* 1844, *inclusive.*

To William Wylam, of the borough and county of Newcastle-upon-Tyne, in England, for an artificial composition, which, if variously modified, may be applied in preparing fuel from coal and other substances, or as a cement, or as a substitute for stone, or as a coating for metals and other substances.—Sealed 27th December.

Francis L'Estrange, of 39, Dawson-street, in the city of Dublin, Master of Arts, Fellow of the Royal College of Surgeons of Ireland, for improvements in hernial trusses, to prevent the descent of hernia through the internal as well as the external ring.—Sealed 6th February.

Thomas Drayton, of Brighton, in the county of Sussex, Gent., for improvements in coating glass with silver for looking-glasses and other uses.—Sealed 12th February.

William Prosser, Jun., of Shaftsbury-terrace, Pimlico, Gent., for improvements in the construction of roads, and in carriages to run thereon.—Sealed 15th February.

George Gwynne, of Regent-street, in the county of Middlesex, Gent., and George Ferguson Wilson, of Belmont, Vauxhall, in the county of Surrey, Gent., for improvements in the manufacture of candles, and in apparatus for, and processes of, treating fatty and oily matters, to obtain products for the manufacture of candles and other uses.—Sealed 15th February.

List of Patents

Granted for SCOTLAND, subsequent to January 22nd, 1844.

To Thomas Aspinwall, of Bishopsgate Church-yard, in the city of London, Esq., for an improved cannon, formed either of wrought-iron or steel, or wrought-iron and steel combined; and also instruments and machinery used in making, and method of making the said cannon,—being a communication from abroad.—Sealed 25th January.

Thomas Southall, of Kidderminster, in the county of Worcester, druggist, and Charles Crudgington, of the same place, banker, for improvements in the manufacture of iron and steel.—Sealed 25th January.

Alexander Spears, of Glasgow, merchant, for certain improvements on, or appertaining to, glass bottles, proper for wines and other liquids,—being a communication from abroad.—Sealed 31st January.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, civil engineer, for a new or improved system of machinery or apparatus for obtaining and applying motive power for propelling on railways or water, and for raising heavy bodies; applicable also to various other purposes where power is required,—being a communication from abroad.—Sealed 5th February.

Philip Walther, of Angel-court, Throgmorton-street, in the city of London, merchant, for certain improvements in the construction of steam-engines,—being a communication from abroad.—Sealed 5th February.

John Kibble, of Glasgow, in the kingdom of Scotland, Gent., for improvements in transmitting power in working machinery where endless belts, chains, or straps are or may be used.—Sealed 12th February.

Hugh Inglis, of Kilmarnock, in the county of Ayr, Scotland, mechanic, for improvements upon locomotive steam-engines, whereby a saving of fuel will be effected, which improvements are applicable to steam-vessels and other purposes, and to the increasing the adhesion of the wheels of railway engines, carriages, and tenders, upon the lines of rail, when the same are in a moist state.—Sealed 13th February.

Ezra Jenks Coates, of Bread-street, Cheapside, in the city of London, merchant, for improvements in the forging of bolts, spikes, and nails,—being a communication from abroad.—Sealed 15th February.

New Patents
SEALED IN ENGLAND.
1844.

Robert Johnstone, of Baker-street, Middlesex, Gent., for improvements in the construction of lamps for the combustion of naphtha, turpentine, and other resinous oils. Sealed 27th January—6 months for inrolment.

Henry Vernon Physick, of Bath, civil engineer, for certain improvements applicable to machinery for driving piles. Sealed 30th January—6 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for improvements in the preparation of caoutchouc, or india-rubber, and in manufacturing various fabrics of which caoutchouc forms a component part,—being a communication. Sealed 30th January—6 months for inrolment.

Ezra Washington Burrows, of Swinton-street, Saint Pancras, civil engineer, for certain improvements in the construction of engines for producing and communicating motive power by the elastic force of steam, or by manual or animal labour. Sealed 30th January—6 months for inrolment.

George Miller Clarke, of Albany-street, Regent's-park, tallow-chandler, for improvements in night lights, and in apparatus used therewith. Sealed 30th January—6 months for inrolment.

William Lucas Sargant, of Birmingham, for improvements in the manufacture of barrels for fire-arms,—being partly a communication. Sealed 30th January—6 months for inrolment.

Baptiste Buret, of Leicester-square, merchant, and François Marius David, of the same place, manufacturer of gas apparatus, for improvements in the manufacture of gas. Sealed 30th January—6 months for inrolment.

James Silcock, of Birmingham, engineer, for certain improvements in planes. Sealed 30th January—6 months for inrolment.

William Fletcher, of Moreton House, Buckingham, clerk, for certain improvements in the construction of locks and latches, applicable for doors and other purposes. Sealed 30th January—6 months for inrolment.

Robert Hodgson, of Princes-street, Clapham-road, Surrey, engineer, for improvements in propelling vessels, and in the machinery for working the same. Sealed 2nd February—6 months for inrolment.

William Sangster, of Regent-street, in the County of Middlesex, umbrella and parasol manufacturer, for improvements in umbrellas and parasols. Sealed 6th February—6 months for inrolment.

Benjamin Aingworth, of Birmingham, Gent., for certain improvements in manufacturing buttons for wearing apparel. Sealed 6th February—6 months for inrolment.

Thomas Southall, of Kidderminster, druggist, and Charles Crudginton, of the same place, banker, for improvements in the manufacture of iron and steel. Sealed 8th February—6 months for inrolment.

James Johnston, of Willow Park, Greenock, Esq., for improvements in steam-boilers. Sealed 8th February—6 months for inrolment.

Christopher Nickels, of the York-road, Lambeth, Gent., for improvements in the manufacture of crape or substitutes for crape. Sealed 8th February—6 months for inrolment.

Ezra Jenks Coates, of Bread-street, Cheapside, merchant, for improvements in apparatus for facilitating the reduction of fractures, dislocations of bones, and for maintaining the parts in their just positions,—being a communication. Sealed 8th February—6 months for inrolment.

Charles Wheatstone, of Conduit-street, Hanover-square, Gent., for improvements on the concertina, and other musical instruments, in which the sounds are produced by the action of wind on vibratory springs. Sealed 8th February—6 months for inrolment.

John Cox, and George Cox, of Gorgie Mills, Edinburgh, manufacturers of leather and gelatine, for improvements in the manufacture of leather and gelatine. Sealed 8th February—6 months for inrolment.

George Straker, of Newcastle, ship-owner, for a certain improvement or certain improvements in ships' windlasses. Sealed 8th February—6 months for inrolment.

Edwin Sheppard, of Manchester, for certain improvements in machinery or apparatus for planing, sawing, and cutting wood, and other substances. Sealed 8th February—6 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for a new or improved system of machinery or apparatus for obtaining and applying motive power, for propelling on railways or water, and for raising heavy bodies; applicable also to various other purposes where power is required,—being a communication. Sealed 8th February—6 months for inrolment.

Joseph Gibson, Jun., of Birmingham, japanner, for improvements in ornamenting glass. Sealed 10th February—6 months for inrolment.

Henry Hawes Fox, of Northwoods, Gloucester, Doctor of Medicine, for an improved mode of constructing fire-proof floors, ceilings, and roofs. Sealed 10th February—6 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for an improvement or improvements in furnaces,—being a communication. Sealed 12th February—6 months for inrolment.

William Geeves, of Little Portland-street, cork, and cork gun-wadding manufacturer, for improvements in preparing wood for lighting or kindling fires. Sealed 12th February—6 months for inrolment.

Job Haines, of Tipton, Stafford, coal-master, and Richard Haines, of the same place, coal-master, for an improved method or methods of making or manufacturing links for the construction of flat chains, used for mining and other purposes. Sealed 13th February—6 months for inrolment.

Bennett Woodcroft, of Manchester, engineer, for improvements in propelling vessels. Sealed 13th February—6 months for inrolment.

James Overend, of Liverpool, Gent., for improvements in printing fabrics with metallic matters, and in finishing silks and other fabrics,—being a communication. Sealed 13th February—6 months for inrolment.

Andrew Kurtz, of Liverpool, manufacturing chemist, for certain improvements in apparatus to be employed for drying, evaporating, distilling, torrefying, and calcining. Sealed 14th February—6 months for inrolment.

Elijah Galloway, of Union-place, City-road, civil engineer, for certain combinations of materials to be used as a substitute for canvass, and other surfaces employed as grounds for painting, and some of which combinations are applicable to other purposes. Sealed 14th February—6 months for inrolment.

Samuel Dobree, of Putney, Esq., for certain improvements in the manufacture of fuel,—being a communication. Sealed 17th February—6 months for inrolment.

John Lionel Hood, of Old Broad-street, Gent., for an improved composition or mixture of metals, applicable to the manufacture of sheathing for ships, and other vessels, bolts, nails, or other fastenings,—being a communication. Sealed 17th February—6 months for inrolment.

John Kibble, of Glasgow, Gent., for improvements in transmitting power in working machinery where endless belts, chains, or straps, are or may be used. Sealed 17th February—6 months for inrolment.

William Losh, of Newcastle, Esq., for improvements in the manufacture of metal chains, for mining and other purposes. Sealed 17th February—6 months for inrolment.

Alexander Alliott, of Lenton, bleacher, for improvements in fulling, stretching, drying, and dressing goods manufactured of wool, cotton, silk, and other fibrous materials. Sealed 19th February—6 months for inrolment.

Caleb Bedells, of Leicester, manufacturer, for improvements in the manufacture of elastic fabrics. Sealed 19th February—6 months for inrolment.

Christopher Nickels, and Benjamin Nickels, of York-road, Lambeth, manufacturers, for improvements in the manufacture of elastic fabrics, and in rendering elastic fabrics less elastic. Sealed 19th February—6 months for inrolment.

Alfred Jeffery, of Brunton Works, Limehouse, for improvements in treating wood, and certain other substances required to be exposed to water. Sealed 19th February—6 months for inrolment.

Alexander Parkes, of Birmingham, artist, for improvements in the manufacture of certain alloys or combinations of metals, and in depositing certain metals. Sealed 21st February—6 months for inrolment.

William Sheldon, of Birmingham, japan painter, for improvements in the manufacture of buttons, and in japanner's ware, and articles in substitution of papier-maché. Sealed 21st February—6 months for inrolment.

Ezra Jenks Coates, of Bread-street, Cheapside, merchant, for improvements in the forging of bolts, spikes, and nails. Sealed 21st February—6 months for inrolment.

Henry Charles Howells, of Hay, Gent., for improvements in the fastenings of parts of bedsteads and other frames,—being a communication. Sealed 21st February—6 months for inrolment.

Thomas Liddell, of Newcastle, engineer, for improvements in apparatus for preventing explosion in steam boilers. Sealed 21st February—6 months for inrolment.

Robert Rettie, of Gourock, Scotland, civil engineer, for improvements in gridirons, frying-pans, and other cooking utensils and heating apparatus. Sealed 24th February—6 months for inrolment.

Francis Studley, of Shrewsbury, Gent., for an improved mill or apparatus for grinding grain, with or without sifter or dresser; also for cobling, bruising, crushing, cutting, splitting, or dividing seed, pulse, berry, or other articles. Sealed 24th February—6 months for inrolment.

Alexander Alliott, of Lenton, Nottingham, bleacher, for improvements in scouring, bleaching, and dyeing.—Sealed 24th February—6 months for inrolment.

Thomas Masterman, of the Dolphin Brewery, Broad-st., Ratcliff, common brewer, for a certain method of mechanism for the speedy cooling of liquids, being within certain degrees of temperature: and which method or mechanism he terms a "refrigerator." Sealed 24th February—2 months for inrolment.

William Rouse, of Great Barton, Bury St. Edmonds, wheelwright, for certain improvements in carriages, and in parts of carriages applicable to various purposes. Sealed 24th February—6 months for inrolment.

Peter Rothwell Jackson, of Strawberry Hill, Manchester, engineer, for certain improvements in the construction and manufacture of wheels, cylinders, hoops, and rollers; and in the machinery or apparatus connected therewith; and also improvements in steam valves. Sealed 24th February—6 months for inrolment.

Henry Brown, of Selkirk, for improvements in carding silk, cotton, and other fibres. Sealed 24th February—6 months for inrolment.

Benjamin Bailey, of Leicester, framesmith, for improvements in machinery for manufacturing looped fabrics. Sealed 24th February—6 months for inrolment.

Caleb Bedells, of Leicester, manufacturer, for improvements in the manufacture of bonnets, collars, caps, capes, shawls, coats, gaiters, scarfs, stockings, gloves, and mits. Sealed 24th February—6 months for inrolment.

Gaspare Conti, of James-street, Buckingham Gate, Gent., for improvements in hydraulic machinery, to be used as a motive power. Sealed 24th February—6 months for inrolment.

John Aitken, of Surrey-square, for improvements in atmospheric railways. Sealed 24th February—6 months for inrolment.

Archibald Trail, of Great Russell-street, Bloomsbury, for an improvement in the manufacture of sails for ships and other vessels. Sealed 24th February—6 months for inrolment.

James Smith, of Queen-square, Westminster, Esq., for improvements in slubbing, spinning, twisting, and doubling cotton and other fibrous substances. Sealed 24th February—6 months for inrolment.

Isabella Larbalestier, of Noble-street, Falcon-square, London, furrier, for improvements in making certain skins resemble the sable fur. Sealed 26th February—6 months for inrolment.

Richard Kitson, of Cleckheaton, card manufacturer, and John Garthwaite, of Leeds, flax spinner, for improvements in wire cards for carding cotton, wool, silk, flax, and other fibrous substances; and for producing tow and yarns from line and tow-yarn waste which comes from the spinning frames, commonly called "hard waste."—Sealed 27th February—6 months for inrolment.

Charles Newington, of Ticehurst, Sussex, Esq., for certain improvements in apparatus for ascertaining and indicating the time at which a person is present at a particular place. Sealed 27th February—6 months for inrolment.

Thomas Harbottle, of Manchester, Gent., for a machine designed for manufacturing boot soles, taps, and also for riveting leather hose traces; and for other purposes to which the same may be usefully applied. Sealed 27th February—6 months for inrolment.

CELESTIAL PHENOMENA FOR MARCH, 1844.

D.	H.	M.	
1			Clock before the sun, 12m. 32s.
	—		☽ rises 1h. 54m. A.
	—		☽ passes mer. 9h. 39m. A.
	—		☽ sets 4h. 41m. M.
4			Occul. g^1 Leonis, im. 7h. 59m. em. 9h. 1m.
4	2	25	☿ in Aphelion
	9	2	Ecliptic oppo. or ○ full moon
	19	6	♀ in the ascending node
5			Clock before the sun, 11m. 40s.
	—		☽ rises 7h. 12m. A.
	—		☽ passes mer. 0h. 11m. M.
	—		☽ sets 6h. 17m. M.
6	20		☽ in Perigee
11	1	20	☽ in □ or last quarter
12			Occul. π Sagittarii, im. 16h. 49m. em. 17h. 41m.
14	7	54	♄ in conj. with the ☽ diff. of dec 4. 7. S.
15			Clock before the sun, 9m. 2s.
	—		☽ rises 4h. 29m. M.
	—		☽ passes mer. 9h. 23m. M.
	—		☽ sets 2h. 27m. A.
17			Mercury R. A. 22h. 42m. dec. 10. 34. S.
	—		Venus R. A. 2h. 11m. dec. 14. 1. N.
	—		Mars R. A. 2h. 26m. dec. 14. 57. N.
	—		Vesta R. A. 19h. 39m. dec. 19. 51. S.
	—		Juno R. A. 1h. 14m. dec. 1. 56. N.
	—		Pallas R. A. 16h. 19m. dec. 12. 46 N.
	—		Ceres R. A. 16h. 22m. dec. 18. 52. S.
	—		Jupiter R. A. 23h 3m. dec. 7. 5. S.
	—		Saturn R. A. 20h. 27m. dec. 19. 27. S.
	—		Georg. R. A. 0h. 8m. dec. 0. 9. S.
	—		Mercury passes mer. 23h. 4m.
	—		Venus passes mer. 2h. 31m.
	—		Mars passes mer. 2h. 46m.
	—		Jupiter passes mer. 23h. 20m.
	—		Saturn passes mer. 20h. 44m.
	—		Georg. passes mer. 0h. 27m.
18	23	50	♅ in conj. with the ☽ diff. of dec. 5. 59. S.
19	0	17	Ecliptic conj. or ● new moon
19	23	50	☉ enters Aries,—Spring com.
20			Clock before the sun, 7m. 23s.
	—		☽ rises 6h. 5m. M.
	—		☽ passes mer. 1h. 4m. A.
	—		☽ sets 8h. 17m. A.
20	21	3	☿ in conj. with ♃ diff. of dec. 1. 25. S.
22	2	57	♀ in conj. with the ☽ diff. of dec. 1. 56. S.
	6	7	♂ in conj. with the ☽ diff. of dec. 2. 25. S.
		29	♅ in conj. with the ☉
	19		☽ in Apogee
24	12	52	☿ greatest Hel. Lat. S.
25	10	49	♀ in conj. with the ☽ diff. of dec. 0. 47. N.
	—		Clock before the sun, 6m. 2s.
	—		☽ rises 8h. 36m. M.
	—		☽ passes mer. 4h. 57m. A.
	—		☽ sets 0h. 28m. M.
26			Occul. 15 Geminorum, im. 13h. 9m. em. 13h. 51m.
27	5	2	☽ in □ or first quarter
28			Occul. r Cancri, im. 7h. 22m. em. 8h. 23m.
29			Pallas stationary
			Occul. a^2 Cancri, im. 10h. 44m. em. 11h. 24m.
30			Clock before the sun, 4m. 29s.
	—		☽ rises 2h. 1m. A.
	—		☽ passes mer. 9h. 6m. A.
	—		☽ sets 3h. 33m. M.
	13	46	☿ in conj. with ♅ diff. of dec. 1. 13. S.
31	19	12	Ceres stationary

The Satellites of Jupiter are not visible this Month, Jupiter being too near the Sun.

J. LEWTHWAITE, Rotherhithe.

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No. CXLVIII.

RECENT PATENTS.

[illegible] L[illegible]ster, of Dursley, in the county of Gloucester, [illegible]facturer, and Lewis Budding, of the same [illegible], for certain improvements in the means of [illegible] the [illegible] cylinders of carding and scribbling-engines with [illegible]; [illegible] in condensing the rovings delivered from [illegible]; [illegible] also in apparatus for sharpening or [illegible] the [illegible]s of the cards; which latter apparatus [illegible] for grinding other articles.—Sealed

[illegible] and scribbling-engines [illegible] commenced [illegible] has [illegible] and keeping the [illegible] or [illegible] upon the peripheries of [illegible] between. [illegible] to obviate [illegible] a peculiar [illegible] of wire [illegible] and easy, [illegible] of the

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The second feature of the invention is a means of condensing the rovings or slivers of filamentous materials, delivered from carding-engines, so as to give them a tenacity sufficient for the future operations of spinning. This is effected by passing the collection of fibres, delivered from a narrow band or fillet of wire cards, between two rubbing surfaces, by the friction of which the fibres are compressed together, and made to adhere into the compact form of slubbings.

The third head of the invention is an improvement in apparatus for grinding or sharpening the points of the wires of cards and other articles; which is effected by the use of fillets of leather or other suitable material, covered with emery or other grit; which fillets are wound round suitable cylinders, and may be readily replaced, when worn, by the substitution of fresh or new fillets of a like kind.

Fig. 1, in Plate VII., is a side elevation of the machine for covering the cylinders of carding-engines with bands or fillets of cards. *a, a, a,* represents the cylinder about to be covered, which is made in the ordinary way of constructing carding cylinders; *b, b,* is the fillet or band of card, in the act of being wound round the cylinder in a helical curve; *c, c, c,* is the frame-work or standards of a carding-engine, on which the axle or shaft of the cylinder is mounted in the ordinary way; *d, d,* is a slide-rest, similar to those used for turning wood rollers or cylinders, and which is made fast to the two side-frames of the engine by screw-clamps or otherwise. Upon this slide-rest is mounted a sliding-carriage *e,* on which is fixed a stationary hoop or barrel *f.* From the front of this sliding-carriage a socket is pendent, which carries the axle of a pinion *g.* Along the under side of the front edge of the slide-rest there is a rack *h, h,* affixed, which the teeth of the pinion *g,* take into. It will hence be perceived, that by turning the winch *i,* the pinion will be made to rotate, and, by its action in the teeth of the rack *h,* will cause the sliding-carriage *e,* with its hoop *f,* to move laterally.

When a fillet or band of wire cards *b,* is to be attached to the cylinder *a,* it is passed round the hoop or barrel *f,* the end of the fillet being made fast to the periphery of the cylinder, near its edge, in the usual way. The fillet is held tight against the periphery of the hoop *f*, by means of a friction-clamp *k*, which is pressed tight against the face of the card-fillet by springs. The clamp *k*, is held by two sliding-rods *l*, passed completely through the hoop in two places. Upon each of these sliding-rods *l*, there is a compressed helical spring *m*, acting outwards, which is resisted, at one end, by the interior of the hoop *f*, and at the other by an adjustable nut *n*, capable of being moved upon the rod *l*, for the purpose of giving any required degree of tension to the spring. By these means the friction-clamp *k*, is drawn with considerable force, so as to produce any required pressure of the clamp upon the card-fillet. An adjustable nut or stop *p*, is screwed upon each of the sliding-rods *l*, for the purpose of opening the clamp, when the fillet is first introduced.

Having thus distended the fillet of card, in order to wind it round the cylinder *a*, in a helical curve, the cylinder must be made to revolve upon its axis, and, at the same time, the hoop *f*, and friction-clamp *k*, must be moved laterally; the latter of which is done, as before described, by hand, by turning the winch *i*, and pinion *g*, which moves the hoop and friction apparatus along the slide-rest. The rotation of the cylinder *a*, is effected by means of a toothed wheel *q*, *q*, temporarily fixed upon the end of the shaft of the cylinder, by means of four screws *r*, *r*, *r*, *r*, standing radially, or by any other convenient means. This mode of attachment is desirable, in order to apply the wheel to axles of different diameters. The wheel *q*, has two circular bosses or shoulders extending from it, one on each side, upon which the eyes of a forked bracket *s*, fit loosely, so as to enable the wheel to turn freely therein, and the arms of the brackets are confined laterally upon the bosses, by rings *t*, *t*. In order to mount this forked bracket upon the bosses of the wheel, the fork is made in two pieces, and connected together, at the outer end, by screws. This outer end of the forked bracket has a socket, in which a vertical shaft *u*, is supported, and turned by a winch. Upon this shaft is fixed a worm *v*, which takes into the teeth of the wheel *q*; hence, by the rotation of the shaft and worm *u*, *v*, the cylinder *a*, with its wheel *q*, is made to revolve slowly, and to wind round its periphery the fillet of card, which is drawn from between the hoop *f*, and clamp *k*, and by the friction of their surfaces is held with sufficient tension to distend and lay the band or fillet tightly and evenly round the cylinder. In order to hold up the outer end of the forked bracket, it will be found convenient to apply thereto a support *w*, which is made adjustable, as to length, by a part of the support sliding in a socket, thereby enabling the apparatus to be adapted conveniently to carding-engines of various heights.

When the cylinder has been thus covered with the fillets or bands of wire cards, the end of the fillet may be held by a pair of pincers, as shewn at *x*, in fig. 2; a cord or strap *y*, being attached to the arms of the pincers, which cord or strap is fastened at the other end to a pin or stud *z*, on the sliding carriage; and by that means the end of the fillet is held tight upon the cylinder, whilst it is being secured by nails or other means. As the cylinders of carding and scribbling-engines are sometimes covered with sheet cards, the apparatus last described, and shewn at fig. 2, may be employed for the purpose of holding the sheets distended, whilst they are being affixed thereto.

The lesser cylinders, such as the doffers, workers, and strippers of a carding-engine, may be covered with fillets of card by the same means and apparatus as that above described.

The fillets, bands, or sheets of card having been properly secured upon the peripheries of the card-cylinders, the whole of the apparatus, marked from *d*, to *w*, is to be removed. The ordinary appendages may then be applied, and the engine may be made ready for work.

The improvements in condensing the rovings or slivers of filamentous materials, delivered from a carding-engine, is represented at fig. 3, which is a side elevation of a portion of a carding-engine, with the novel parts attached thereto. The fibres of the material having passed through the carding-engine in the ordinary way, they are taken off the main cylinder by the doffer-cylinders *a*, *a*. These doffer-cylinders are formed with series of separate rings, or narrow annular bands of wire cards, from which the slivers are severally taken in strips, and conducted between rubbing surfaces, consisting of the rollers *b, b,* and the superincumbent pressers *c, c,* from whence they are led off to lapping rollers, bobbins, or any other suitable receivers. Fig. 4, represents a partial top horizontal view of fig. 3, shewing the forms and positions of the parts more evidently; and fig. 5, is a section taken vertically through the rubbing surfaces only. The slivers from the bands or rings of the doffer-rollers, being taken off by doffer-combs, or any other ordinary means, are severally conducted over the surfaces of the revolving rollers *b, b,* and the fibres are in that situation pressed upon by the surfaces of the hollow pressers *c, c.* These pressers slide upon axles or horizontal guide rods, *d, d,* and may receive reciprocating lateral movements by means of a T-formed lever *e*; which lever works upon a fulcrum pin at its centre, fixed in the standard frame. A crank or excentric pin *f,* at the end of a horizontal shaft *g,* operates in a slot at the foot of the lever, and as the shaft *g,* is made to revolve by any convenient means connected with the engine, the lever is caused to vibrate, and thereby to slide the pressers *c, c,* upon their guide rods, to and fro in lateral directions; or their lateral movements may be effected by any other suitable means. Upon each of the axles or guide rods *d, d,* a roller *h, h,* is fixed, which pinches the fibres of the carded material against the rollers *b, b,* whilst the pressing and rubbing is effected behind them. By these means the several strips of sliver become compressed and condensed into distinct strands, or into the condition generally denominated slubbings, and are thence led off by the rotation of the rollers *h, h,* to be lapped, wound on bobbins, or into receptacles ready for spinning. It may be further observed, that the rubbing surfaces, both of the rollers and the pressers, should be covered with leather, or some other material capable of producing a slight friction, in order to render them slightly adhesive. A modification of this contrivance is shewn at figs. 6, and 7, by means of which, slivers which are taken from card-bands in oblique directions may be condensed. Fig. 6, is a horizontal representation; and fig. 7, a vertical view of the improved parts detached. *a,* is the band answering to the doffer-cylinder; *b,* the friction roller;

and *c*, the presser. The sliver, doffed obliquely from the card-band *a*, is passed between the revolving roller *b*, and the reciprocating sliding presser *c*, by which the fibres are brought together into a condensed state, and led off under the roller *h*, in the form of what is called wool-rollers, prepared for the mule or billy; the rotary motion of the roller *b*, and the reciprocating motion of the sliding pressers *c*, being effected by any convenient means, as described in reference to the preceding figures.

In preparing cylinders for grinding the points of cards, and other articles, long strips or fillets of leather, or other suitable material, are coated with a cement and emery or other grit, in the usual way of preparing emery cloth or emery paper; the said strips or fillets are then wound tightly round the cylinders, in the manner above described; and when the emery or grit of such bands has been worn off by use, so as to be no longer capable of working, the rollers are stripped, and re-covered with fresh fillets.

The patentees claim as their invention, Firstly,—the mode of distending and holding tight and even, fillets, bands, or sheets of wire card upon the surfaces of cylinders, by means of the friction and tension apparatus; and also the means of winding the fillets or bands of wire card upon such cylinders, as described, however that apparatus may be modified or varied in form or position. Secondly,—the mode of pressing or condensing the slivers or rovings of wool, and other filamentous materials, delivered from carding-engines, by means of the rotatory rollers and reciprocating sliding surfaces, as described. And Thirdly,—grinding the points and edges of wire cards, and other articles, by the use of fillets of leather, or other suitable material, covered with cement and emery or other grit, and wound round the peripheries of cylinders, as shewn in the drawings, whereby the grinding surfaces may be readily replaced after they have become worn. [*Inrolled in the Petty Bag Office, December*, 1843.]

Specification drawn by Messrs. Newton and Son.

To Charles De Bergue, *of Broad street, London, merchant, for improvements in axletrees and axletree-boxes, —being a communication.*—[Sealed 21st August, 1841.]

This improvement consists in the employment of a divided nut to secure an axletree-box upon an axletree, in the manner represented in Plate VIII. *a*, fig. 1, is the end or arm of the axletree, upon which, between the shoulders *b*, *c*, the two halves of the divided nut *d*, (see fig. 2,) are placed, and on this nut the axletree-box *e*, is screwed; the screw-thread of the nut *d*, is cut in the opposite direction to that in which the box *e*, is designed to turn, so that the subsequent rotation has a tendency to tighten the screwing, and keep the nut firm in its place, when moving. The oil, or other lubricating material, is contained in the screw-cap or chamber *f*, and in the annular cavity *g*, formed in the box; and the escape of the oil is prevented by a collar of sponge, or other suitable packing, let into a groove *g*, in the shoulder *b*.

When the box *e*, and the wheel to which it is attached, are required to be removed from the axle, the nut *d*, must be held stationary, by a key or spanner, and the wheel and box turned backwards until they are released from the nut.

The patentee claims, as his invention, the divided nut *d*, and the screwed part of the axletree-box, as applied to axletrees and axletree-boxes, for the purpose hereinbefore described. [*Inrolled in the Inrolment Office, February,* 1842.]

To Joseph Gibson, *of Birmingham, in the county of Warwick, manufacturer, for certain improvements in axletrees and axletree-boxes.*—[Sealed 23rd May, 1842.]

The patentee divides his invention into three parts, namely, a method of preventing the lateral motion of an axletree-box upon the axletree; also lubricating the moving parts of an axletree and box; and securing the box on the axletree.

These improvements are shewn in Plate VIII., wherein fig. 1, represents a longitudinal section of the end of an axletree, and the box belonging thereto. *a,* is the arm of the axletree, formed with a shoulder *b,* just behind what is generally termed the "coned part;" *c,* is a nut or collar, cut with a left-handed screw upon the smaller part of its periphery, (as seen in the detached view, fig. 2,) and working upon the shoulder *b,* and the coned part of the axletree; *d, d,* are two leather washers; and *e,* is a six-sided nut, which is screwed on the coned part of the axletree, for the purpose of retaining the nut *c,* in its proper position; this nut *e,* has a radial hole bored through the centre of each of its sides; and in that one which is uppermost, when the nut is screwed up, is inserted a pin *f,* the lower end of which enters a groove *g,* formed along the upper side of the arm *a,* and thus prevents the nut from working loose. The axletree-box *h,* is screwed on to the nut *c,* and is prevented from becoming accidentally unscrewed by a bolt *i,* (shewn separately at fig. 3,) the edge of which is forced into a recess in the end of the box *h,* by two springs *j, j,* fig. 2. The bolt *i,* does not offer any resistance to the screwing up of the box *h,* but effectually prevents the unscrewing of the same, until it is drawn back within the hollow part of the nut *c,* by inserting a pointed instrument in the holes c^1, and i^1, of the nut and bolt; the nut being at the same time prevented from turning, by the instrument also entering the hole *k,* in the shoulder *b.* The box *h,* may have any required number of recesses in its end; and the bolt *i,* may be acted on by a spring at one end only.

The oil, or other material for lubricating the axle, is introduced through the holes in the nut *c,* and shoulder *b,* into the groove *g,* along which it flows into the reservoir formed by the screw-cap *l.*

The patentee claims, Firstly,—the method of preventing the lateral motion of an axletree-box upon an axletree, by means of a screwed collar upon the coned part of the axletree, as hereinbefore described. Secondly,—the method of lubricating the moving parts of an axletree and axletree-box, herein described. Thirdly,—the method, herein described, of securing the axletree-box upon the axletree.—[*Inrolled in the Inrolment Office, November,* 1842.]

To **Thomas Wolferstan**, *of Salisbury, iron-founder, for certain improvements in axletrees and axletree-boxes.*—Sealed 11th February, 1843.]

This invention consists in placing the supply of oil in the centre of the axle-arm, instead of its being contained in the axletree box, as usual; whereby a much larger supply can be carried than is ordinarily practicable, and the bulk of the oil is kept in such a state of comparative rest, during the motion of the carriage, as well as complete exclusion from the atmosphere, that it remains limpid and unfouled to the last.

A longitudinal section of the arm of the axle, and the axletree-box, is shewn in Plate VIII. *a*, is the axle-arm; *b*, the box; *c*, the oil reservoir in the centre of the arm *a*, from which the oil flows to the exterior of the arm through the opening *d*; *e*, a screw-tap for closing the passage through which the oil is poured into the reservoir; *f*, an iron collar; *g*, *g*, two leather collars; and *h*, the snug and screw-fixing collars of the box.

The patentee states, that he does not confine his invention to the axles and axletree boxes of carriages, as it is applicable to revolving axles, and shafts of all sorts, requiring lubrication.

He claims the making of a reservoir for the oil in the centre or heart of the axle, and so placing and adjusting the inlet and outlet passages of the same, that no more than the requisite quantity of oil shall be at all times supplied to the exterior of the axle; and, likewise, so connecting the axle and box, that the reservoir can be replenished without disconnecting them.—[*Inrolled in the Inrolment Office, August,* 1843.]

To **William Edward Newton**, *of the Office for Patents,* 66, *Chancery-lane, in the county of Middlesex, civil engineer, for an improved agricultural machine, or implement for ploughing, harrowing, or tilling land,—being a communication.*—[Sealed 13th July, 1843.]

The machine or apparatus, which forms the subject of the present patent, is called by the inventor a plough-harrow, or harrow-plough, as it partakes of the nature and performs the office of both these implements. It will also act as a scarifier for clearing foul lands, and for extracting from the earth any fibrous roots, or things that might be injurious to vegetation. It may further be employed for breaking or turning up heaths or common land; and for dragging or tearing up the roots of reeds in marshy lands; for cutting up hard earth; and other similar purposes.

In Plate VIII., fig. 1, represents a general plan of the whole machine. Fig. 2, is a vertical section, taken through the middle of the apparatus, on the line 1, 2, of the plan view, fig. 1. The machine is composed of two principal parts, which are altogether distinct, namely, 1st,—the fore carriage, which consists of two wheels and a framing, with the pole or shafts for three horses; 2nd,—the hinder carriage, which consists of two wheels and the framing of the harrow-plough, furnished with seven, nine, or eleven teeth or tines.

In the harrows generally known as three-wheel harrows, the fore carriage has only one wheel, which is of a small diameter, and merely serves as a support for the frame of the hinder part; this arrangement of parts is particularly disadvantageous, because it renders the draft of the implement very heavy. In the improved harrow, the fore carriage has two wheels, of a considerably greater diameter, and mounted upon the same or one common axletree, to which is connected the pole or shafts. This arrangement, on the one hand, very sensibly diminishes the friction or resistance, and presents a more solid and regular point of support for the hinder part of the carriage; and, on the other hand, allows the machine or apparatus to be turned round with much greater facility, and within a more limited space. These two wheels are seen at A, in the drawings, and are about two feet in diameter. To the centre part of the axletree B, is bolted a vertical bar C, of wrought-iron, and in the upper part of the bar C, a rectangular mortice is made, for the purpose of receiving a pin or bolt, by means of which the end of the cast-iron swan's-neck framing D, is held up. The two wooden shafts E, are connected and bolted to the axletree and cross-piece F, to which are hooked or fastened the whipple-trees G, G, G. The upper end of the vertical bar C, is sustained and connected by two thin round iron rods *a*, to the cross-piece F, as seen in the drawing, at figs. 1, and 2; and it also carries another rod *b*, which is curved, and is destined principally to support the cords or reins of the horses. The cast-iron swan's-neck D, which connects the framing of the hinder part with the axletree of the fore carriage, is constructed and arranged in the manner shewn in the elevation, fig. 2, in order to allow the large fore wheels A, A, to pass underneath freely, when it is required to make a short turn round. The head or end of this swan's-neck is traversed by the vertical rod C, bolted upon the middle of the fore axletree, upon which the swan's-neck rests, and supports itself firmly when the machine is in operation; and when, on the contrary, the implement is not at work, as for example, when it is passing along roads or ways, or going from one field to another, the swan's-neck is supported at the upper part of the vertical rod by means of a steel cross-pin or bolt. To the other end of the swan's-neck is connected a set-screw *s*, which passes through a female-screw in the plate or block *c*, as shewn in the detached section, fig. 3, taken on the line 3, 4, of fig. 1; this plate or block is furnished with two pivots or bolts, which turn freely in the branches or bearings that form the end of the swan's-neck, and whereby it may be raised or lowered at pleasure. The screw *s*, is furnished, at its upper end, with a small screw-nut *d*, which carries a winch, whereby this part of the machine may be easily worked by hand; and when the screw is turned, either in one way or the other, it raises or lowers the end of the swan's-neck. In order to effect this object, it is necessary that the screw should be held in an iron collar *e*, which, without preventing it from turning freely by itself, holds it securely in connection with the short cross-piece *f*. The ends of the cross-piece *f*, are supported by two bearings, in the cast or wrought-iron curved pieces H, H, which are bolted upon the broadest side of the framing I, of the hinder part or carriage. This part of the machine is intended to regulate (during the progress of the apparatus) the inclination of the wrought-iron teeth or tines J, and the greater or less depth to which they enter, and are intended to cut the earth.

It will be understood, that as the centre of motion of the hinder part of the machine is situated immediately behind the back cross-piece I, that when the set-screw *s*, is turned, by means of the handle or winch, so as to lower the said screw, it tends to raise the first or fore row of teeth or tines; and if it is turned in the contrary direction, so as to raise the screw, it tends to plunge the said tines further into the ground. The teeth or tines J, are generally nine in number, five of which are connected to the cross-piece I, and the other four to the cross-piece I^1. The form or shape of these teeth or tines may be varied, according to the nature of the work they are intended to perform. They should also be made very firm and strong, because of the great resistance which they are likely to experience. Furthermore, they must be arranged in such a manner that each tine may form a separate furrow without interfering with any adjoining one, formed by any other tine. The framing may be so arranged as to carry eleven teeth or tines instead of nine, or only seven may be employed. The peculiar forms of tines, represented in figs. 1, and 2, are used not only for the second operation of ploughing, but also for preparing all sorts of seed-ground; and they may be exchanged for other tines, that are straighter, and less edge-shaped, similar to those shewn at figs. 4, and 5, which may also be advantageously employed for cleaning foul land, and for extracting from the ground every thing that is likely to be injurious to vegetation.

Lastly, this arrangement or system of teeth may, in its turn, if required, be exchanged for knives with cutting edges, such as those shewn at figs. 6, and 7. An exchange of this description can always be made with the greatest facility; as, in order to remove the first tines, it is only necessary to unscrew the nuts which hold them firmly in their places in the cross-pieces I, and I^1, and to put in their place, and in the same holes, those tines that are required, and which may be done in a few minutes.

The two cross-pieces I, and I^1, of the framing which carries the teeth or tines, are made of oak, strengthened by bolts, which prevent them from splitting, and render them stronger and firmer. Their ends are fastened to side-pieces K, and K^1, which are also made of oak. To the two side-pieces, above mentioned, the two wheels L, of the hinder carriage, are adjusted. These two wheels are made of cast-iron, and mounted upon axles altogether independent of each other; the axles being simply short iron pivots, fixed at the lower ends of the wrought or cast-iron racks M, the greater portion of which is toothed, as seen in fig. 2, and upon an enlarged scale at fig. 9. The pinions *h*, consisting of four teeth, gear into the teeth of these racks, and are firmly fixed on the wrought-iron shaft *i*, which turns in bearings in the cast-iron framing N, bolted upon, or otherwise attached to the lateral pieces K, and K^1, of the wooden framing. Upon the shafts or axles *i*, and inside the apparatus, are fastened winches, whereby the pinions may be turned by hand, and independent of each other. Now, it will be easily understood, that, according to the direction in which these winches or cranks are turned, the entire framing, carrying the tines or teeth therewith, will rise or descend; for, as the wheels rest firmly on the ground, it is evident, that by turning the handles, in order to raise the framing, the axles of the pinions will raise themselves, and with them their bearings or supports, and the whole arrangement of the framing, whilst the racks M, will remain stationary in their place; and when the cranks are turned in the contrary direction, the axles of the pinions, and all the framing, will descend. By this means, therefore, the height of the teeth above, or depth below, the surface of the ground on which the machine runs, and also the other evolutions of the machine, may be regulated with great nicety; that is to say, the tines may be inserted more or less in the soil, according to the nature of the ground, and the work or labour to be performed.

The workman can lower or raise the front row of tines a little more than the back row; and to effect this object one or two turns of the small crank of the set-screw will generally be sufficient. He can also, by means of the racks and pinions, raise the whole of the hinder part of the carriage to such an altitude as will place the teeth or tines above the level of the ground, so as to prevent them from touching it, as would be required when passing along a road, or from one field to another; or, if it should be necessary, to clear the teeth from grass, or other extraneous matters. But in order that the hinder framing that carries the tines should either, when at work or at rest, be made to remain at any particular and fixed altitude, it is necessary to furnish each of the axles or shafts *i*, with grooved or toothed discs *l*, which act in the same way as ratchet-wheels, and are made with as many notches or openings as the teeth of the pinions *h*, in order to stop at any point, and without allowing the latter any play. The construction of this catch or ratchet will be easily understood by referring to fig. 8, which represents a side view of the disc, seen also at *l*, in fig. 9, which is a vertical section of a portion of the framing, taken on the line 5, 6, of the plan view, fig. 1. Into one of the notches of each of the discs a sort of iron catch *m*, is made to fall; this iron catch has a handle at its upper end, whereby it may be worked by hand, and a spring, placed behind it in the interior of the box, retains it against the support, as seen in fig. 9, and tends always to make it assume the inclined position, as there represented; and also will not allow it to disengage itself from the toothed disc, whatever shocks or blows the machine may happen to experience. When the pinions are required to be turned, it will be sufficient (in order to disengage the catch) to press it against the spring, so as to bring it into nearly a vertical position, and then to draw it up in this direction.

The patentee states that he lays no claim to any of the parts of the above-described machine or apparatus which have been before known or in use for similar purposes; but he claims the peculiar combination or arrangement of parts, above described, or any modification thereof, as applied to the purposes above mentioned." [*Inrolled in the Rolls Chapel Office, January,* 1844.]

Specification drawn by Messrs. Newton and Son.

To JOHN COOPE HADDAN, *of Bazing-place, Waterloo-road, in the county of Surrey, engineer, and* GEORGE HAWKES, *of Gateshead Iron-works, in the county of Durham, for certain improvements in the construction of wheels for carriages to be used on railways.*—[Sealed 17th October, 1839.]

THE invention which forms the subject of this patent is described, with reference to the drawings, in nearly the following words:—Fig. 1., Plate VII. represents a bar of wrought-iron, having four obtuse bends, and the ends brought together, so as to form a spoke of a wheel. Fig. 2, is a side view of a three-feet wheel, with eight of the said spokes. The thickness of the inner and outer tyres having been decided upon, describe upon a board or sheet of paper the dotted circle A, fig. 1, of the same size as the inner diameter of the inner tyre, and divide the same into as many parts *a, a,* as there are spokes, and draw the dotted lines *a,* B, *a,* B. Describe from the centre B, another dotted circle C, of the same diameter as the nave, and again, a third dotted circle D, so as to divide the space between the dotted circles A, and C, into equal parts. Divide one of the segments *a, a,* into four parts, *a, b, c, d, a.* Bisect the segment of the dotted circle C, and draw the dotted line *g,* B, and parallel thereto draw the two short lines *f, i,* and *f, i,* at the distance of half an inch on either side thereof. Draw the line *f, e, b, c, d, e, f,* and also another line parallel to, and half an inch within the same. This inner line will represent the shape of a cast-iron former or block (having four obtuse and one acute angle), about three inches deep, forming one piece, with a cast-iron table, around which a bar of wrought-iron *z, z,* is bent, when heated. Eight of these bended pieces of wrought-iron being placed with the bends *e, e,* in contact, are held steadily together in a strong iron hoop or ring, suitably constructed, and when properly warmed, the nave P, is cast around the inner ends *f, i,* of the bended bars, in the manner usually practised by iron founders. The eight curved extremities *b, d, b, d,* of the spokes, having eight spaces between them, are then ready for the reception of the inner rim or hoop of wrought-iron E, which, when heated, is placed upon them, and allowed to cool, and is then fastened to each alternate spoke by the four rivets *x, x.* G, is the outer or flanged wrought-iron tyre, which is also heated and shrunk upon the tyre E, and, when cold, is rivetted through the said inner tyre to the four remaining spokes, by the rivets *y, y.* The wheel is finally completed by boring the nave, and turning the tyre G. Should elasticity in the spoke be deemed desirable, either the inner portions *v,* or the outer portions *h,* of the straight parts of the spokes may be slightly curved. For five feet wheels twelve spokes are preferred, having six obtuse bends, fig. 3. Proceed as directed in regard to fig. 1, omitting the dotted circle D. Describe the dotted circles M, and N, so as to divide the distance between the dotted circles A, and C, into three equal parts. Bisect one of the segments *t, t,* of the dotted circle N, and set out spaces, *n, n,* half an inch on either side of the point *m.* Set out two similar spaces *p, p,* on the segment *r, r,* of the dotted circle C, and draw the outer line *r, n, w, b, c, d, w, n, r,* and within the same another line, as directed in regard to fig. 1.

Fig. 4, is a side view of a wheel of a different construction, with the spokes attached, by means of heads or bends to an inner hoop, or tyre, having a groove or recess formed on the outside of the same. Fig. 5, is a transverse section of the tyres. A, fig. 6, is a bar of wrought-iron, which, when heated, is bent about two inches from one end, so as to form a one-sided head *b,* which is curved in a former or mould so as to fit into a recess hereafter described. A similar length *c,* of the other end of the bar A, is also slightly bent in an opposite direction to the bend *b.* C, figs. 4, and 5, is an inner rim or felloe of wrought-iron, having a groove or recess D, around it, equal in depth to the thickness, and of the same breadth as the bar A, through which eight equidistant holes are made, each hole being as long as the groove is wide, and in breadth equal to the thickness of two of the said bars of iron laid together. Into each hole two of the bars A, are to be driven, so as to form a compound spoke, until the heads *b, b,* which are in opposite directions, fit into the groove D. The other ends *c, c,* are then held in contact, as at *f*, fig. 4, and the nave E, cast around them, the bars being first properly heated. In order that the inner ends of the spokes may not enter the nave too far, in consequence of their expansion when heated preparatory to the casting of the nave, the heads *b, b,* must not be confined within the groove D, while the nave is being cast. M, is a flanged wrought-iron tyre, which is heated and shrunk round the inner tyre C, and upon the end *b, b,* of the spokes, and afterwards fastened by the rivets *h, h*. G, fig. 7, is a bar of wrought-iron, with a cut down one end; and G*, is the same bar of iron, with the two parts *x, x,* bent into opposite directions, so as to form a double head or bend; D, is part of a grooved tyre, with the bar or spoke placed at an angle of forty-five degrees with the plane of the wheel. Single or compound spokes, having bended or forged heads, may be placed through holes, cut across, or in the same directions as the groove for the reception of such heads or bends.

Fig. 8, is a side view of a three-feet wheel, in which bars of wrought-iron are passed half way through holes in the tyre, and afterwards bent, so as to form compound spokes. Fig. 9, is a partial section of the same, and fig. 10, is a section of the tyre, with a spoke passed through it. A, is the flanged tyre of wrought or cast-iron, having a rib C, on the inner side, through which eight equidistant holes *g*, are made. The middle of a straight bar of wrought-iron, *a, a,* is made nearly at a welding heat, and quickly pushed half way through one of the holes in the rib *c*, and instantly bent into one position, *x, x,* and then struck on both ends, so as to upset or swell the heated part which is within the hole in the rib C, and in contact with the inside of the tyre A. Each hole is in like manner to have a similar bar inserted and bent. The two ends d^1, and d^2, of each bar, when cold, are then drawn sufficiently close together, by curving, to allow the nave B, to be cast around them. The degree of curvature given to the bars will depend upon the distance left between the two ends of each bar, after being bent and allowed to cool, as before described. When the two ends of each bar are in the position *x, x,* they are, while hot, and before being brought nearer together, preparatory to the casting of the nave, sufficiently inclined edgewise, in opposite directions, to be from half an inch to an inch out of the perpendicular with the nave. This wheel may also be made with an inner and outer tyre, as in fig. 11. In fig. 12, *d*, is a single spoke, with a head or bend *f*, sufficiently long, after passing through the hole in the rib c, to be fastened to the tyre A, by a rivet *k*. In fig. 11, the head or bend of each spoke is heated, and rivetted in the hole in the rib c. In both these figures, the spokes are alternately fastened on opposite sides of the rib c.

The patentees conclude, by claiming, Firstly,—forming the spokes of wheels from bars of wrought-iron, having four obtuse bends, and the ends brought together so as to form an acute angle; which spokes are in contact with, and support each other at the bends which are between the nave and tyre; and also forming the spokes of wheels from bars of wrought-iron, having six obtuse bends. Secondly,—forming the inner tyre of a wheel with a groove or recess around the outside thereof, for the reception of the heads or bends of single or compound spokes; and the fixing of wrought-iron bars or spokes at an angle of forty-five degrees with the plane of the wheel. Thirdly,—the passing bars of wrought-iron half way through holes in a rib on the inside of a wrought or cast-iron tyre, and afterwards bending the same, so as to form compound spokes; or passing the heads or bends of wrought-iron bars or spokes, through the said holes, and fastening the same to the tyre by rivets; or rivetting the heads or bends in the said holes; and also in inclining wrought-iron spokes, when attached to both ends of the nave, so as to be out of the perpendicular, the spokes on one side of the wheel being inclined in an opposite direction to those on the other.—[*Inrolled in the Inrolment Office, April,* 1840.]

To HENRY PAGE, *of Cambridge, in the county of Cambridge, painter, for certain improvements in the mode of painting, graining, or decorating with oil and other colors.*—[Sealed 10th June, 1843.]

THIS invention consists in a novel and peculiar process, by which that branch of painting, called graining, is rendered more simple, less expensive, and more decorative, than by the means hitherto employed for that purpose.

The process, when conducted in the manner following, will be found to answer extremely well:—First, cover the surface required to be decorated (whether such surface be of wood, plaster, floor-cloth, paper, stone, or of any other material), with a coating of oil paint, of any color, in the ordinary manner; and when this is perfectly dry, take some distemper color, ground in water, and mixed with a sufficient quantity of beer to cause it to bind with, or adhere to, the oil-paint ground, previously laid on, and proceed to cover the entire surface of the oil paint, in any convenient manner, with the color, softening it off with a brush, in the ordinary way; and while this surface is quite wet, variegate or decorate the surface, by sprinkling or dotting the same, according to the pattern desired to be obtained, with brushes, sponges, or other suitable materials, or instruments capable of holding spirits; the said instruments or materials being previously dipped into naphtha, spirits of nitre, spirits of wine, or spirits of turpentine; which last spirit the patentee prefers, but does not confine himself to its exclusive use, as any spirit that will not injure the oil-paint ground, before mentioned, or prevent the varnish (afterwards applied) from drying, would answer the purpose. By this means, surfaces may be beautifully figured and decorated with any kind of device or pattern which taste may suggest, the effect being produced as follows:—The spirit, which is applied to the surface of the distemper color, whilst in a wet state, having no affinity for the same, displaces it, thereby causing it to assume various beautiful forms; which, when complete, according to the judgment of the artist employed, are fixed; that is to say, they are prevented from altering their forms, by the application thereto of an instrument known in the trade as a brazier or salamander, until the surface be perfectly dry. The process being now completed, the work may be varnished in the ordinary way.

The patentee remarks, that the distemper color to be employed (which may be of any tint) should be darker than the color of the oil-paint ground, above mentioned; care should also be taken that the distemper color is not opaque, as that would defeat the object in view, which is, that it shall have a pellucid appearance. He also states, that he is perfectly aware of distemper color having being employed for graining, as also brushes and sponges for figuring the same; he does not therefore claim the exclusive use of any of the separate coloring matters or materials lastly above mentioned, except so far as the same may be employed for the purposes of the said invention, which consists in the exclusive use of brushes, sponges, or other suitable materials or instruments, when dipped into a spirit or spirits that will not injure the oil-paint ground, or prevent the varnish from drying. And he further claims the application of such spirit or spirits to a surface or surfaces of distemper coloring matter, whilst the said surface or surfaces is or are in a wet state, as hereinbefore particularly described.—[*Inrolled in the Rolls Chapel Office, December*, 1843.]

To WILLIAM IRVING, *of Regent-street, Lambeth, for an improved corn-drill, or machine for sowing all kinds of seed or grain.*—[Sealed 7th June, 1842.]

THE improved drilling-machine, which forms the subject of this patent, is represented in Plate VIII.; fig. 1, being a side view, with the seed-box in section, and the right-hand running-wheel removed, to shew the parts more clearly; and fig. 2, a plan view of the machine, without the manure-box. It consists of a frame *a*, furnished with a pair of shafts, and carried by two running-wheels; these wheels are mounted on an axle *b*, supported in plummer-blocks, screwed to the frame *a*; and whilst the machine is being transported from one place to another, the wheels turn freely upon their axle; but when the drilling is required to commence, they are firmly affixed to it, by the clutches *c, c*, worked by the levers *d, d*; and, consequently, as the wheels roll onward, the axle will revolve, which, by means of toothed gearing, communicates motion to the apparatus for depositing the seed and manure.

From the front part of the framing *a,* two arms *e, e,* descend, and carry a horizontal rod, that passes through the eyes or sockets at the ends of the arms *f, f,* of the côulters *g, g,* by which the furrows are formed for the reception of the seed and manure; the coulters each carry a weight to prevent them from rising, and are connected by chains *h, h,* with the roller *i.* The upper ends of two rods *j, j,* are also connected to the roller *i,* by chains, (their lower ends being jointed to a board *k,* for the purpose of acting as a press upon the coulters, as hereafter described); and motion is given to the roller, when it is desired to raise or lower the coulters, by means of two chains *l,* and l^1, which pass from the roller *i,* to the cylinder *m.* This cylinder is pierced with numerous holes, for the reception of a lever, and has a ratchet-wheel at each end, the palls *n,* and n^1, of which, act in opposite directions. *o,* is the seed-box, from which eight pipes *p,* descend, and deposit the seed in the furrows formed by the coulters; upon the bottom of this box four plates *q,* are fixed, having each a circular recess for the reception of a "seed-disc" *r,* which turns freely therein, its upper surface being flush with that of the plate *q.* In each of the discs *r,* four or any other required number of holes are made, as shewn in the plan view, fig. 3; into each of which a small quantity of seed falls, and is carried round by the revolution of the disc, until it arrives over the upper end of one of the pipes *p,* where the superfluous seed is removed by a small stiff brush *s,* (fixed over each of the pipes, and pressing upon the discs,) and the remainder drops through the pipe into one of the furrows. The lower part of the holes in the plate *r,* is made wider than the upper part, in order to ensure the proper quantity of seed being discharged from each hole; and the upper ends of any of the pipes *p,* can be closed (to prevent the discharge of seed through those pipes) by means of slides o^1.

Motion is communicated from the axle *b,* to the spindles *t,* of the seed-discs, in the following manner:—Upon the upper end of each spindle is a spur-wheel, and on the two spindles which are nearest the centre of the machine a bevilled cog-wheel t^1, is also fixed, gearing into two bevilled cog-wheels on the shaft *u*; this shaft has likewise a spur-wheel *v*, and pinion *w*, and is driven by the wheel b^1, on the axle *b*, of the running-wheels, taking into the wheel *v*; motion is in this way given to the spindles on which the wheels t^1, t^1, are mounted, and is thence transmitted to the other spindles *t*, through the wheels t^2, t^2.

x, is the manure-box, from which the manure descends, through the funnels and spouts, into the furrows. In the lower part of the box *x*, is a horizontal spindle, provided with scoops or spoons, for throwing the manure into the funnels, and having a pinion *y*, upon it, driven by the wheel b^1; on the end of this spindle is another pinion *z*, which, by gearing into a wheel z^1, gives motion to another spindle z^2, and causes a number of arms or spurs, affixed thereto, to agitate the manure, and thereby facilitate its delivery by the scoops or spoons into the funnels.

When the furrows are required to be deeper than those usually produced by the machine, the pall *n*, is released from its ratchet-wheel, and thrown back; the cylinder *m*, is then turned by its lever, which movement will wind up the chain *l*, and cause the roller *i*, to revolve and take up the chains fastened to the rods *j*, *j*, which, being thus drawn down, press the board *k*, upon the coulters, and force them into the ground to the required depth. Then when the coulters are to be raised, the pall n^1, is released from its ratchet-wheel, instead of the pall *n*; and the cylinder *m*, being turned back, winds up the chain l^1, by which means the roller *i*, is caused to take up the chains *h*, *h*, and thereby raise the coulters into their original position, or into that shewn, by dotted lines, in fig. 1.

If, at any time, the machine should be required to make the deposits of seed nearer together, it can be effected without new seed-discs being necessary, by moving back the plummer-blocks in which the axle *b*, revolves, and sliding the wheel *v*, and pinion *w*, upon the shaft *u*, until the pinion *w*, gears into the wheel b^1; by this means an increased speed is given to the seed-discs, and the deposits of seed will consequently be made closer to each other.

The patentee does not claim the manure-apparatus, or the form of the coulters; but he claims their peculiar arrangement, as shewn at figs. 1, and 2; also the application and use of perforated plates or discs, for dropping or sowing all kinds of seed or grain, and their combination with wheels and pinions, or other mechanical contrivances, for the purpose of carrying out the principle, and its application, as herein described.—[*Inrolled in the Inrolment Office, December,* 1842.]

To David Walther, *of Angel-court, Throgmorton-street, merchant, for certain improvements in the methods of purifying vegetable and animal oils, fats, and tallows, in order to render those substances more suitable to soap-making, or for burning in lamps, or for other useful purposes; part of which improvements are also applicable to the purifying of the mineral oil or spirit commonly called petroleum, or naphtha, or coal-oil, or spirit of coal-tar,—being a communication.*—[Sealed 23rd December, 1840.]

These improvements in purifying vegetable and animal oils, fats, and tallows, consist in subjecting them, in a close vessel, to the action of high-pressure steam, which, entering at the bottom of the vessel, passes through a perforated plate, and ascends through the oil or fat to the upper part of the vessel, where it escapes through a safety-valve, carrying with it the volatile and impure portions of the oil or fat, which gave an offensive smell thereto; and this waste steam may then be condensed, if required, for the purpose of collecting the impure portions of oil or fat carried off by it; or, if this should be considered unnecessary, the steam may be allowed to escape into the open air. The pressure of the steam is gradually increased, until the whole of the impurities are removed; the oil or fat is then drawn off, and allowed to cool; after which it is separated from the water produced by the partial condensation of the steam, and is then filtered in the manner hereinafter described.

An elevation of the apparatus, employed for purifying oil, by the above method, is shewn in Plate IX., *a*, being the vessel in which the oil is operated upon; it is made of copper, or of iron lined with copper, and should be strong enough to bear a pressure of five or six atmospheres, without any danger of bursting. In the lower part of it a circular plate of copper, *b*, pierced with a great number of small holes, is fixed, as indicated by the dotted lines; in the centre of the plate a circle, equal to about one-third of the diameter of the plate, is left unperforated, and in the remaining space the small holes, just mentioned, are made: the reason for leaving this unperforated portion, is to prevent the agitation, produced by the ascending currents of steam, from operating too strongly in the centre of the vessel *a*, lest it might cause the oil to be dashed up so high within the hemispherical top of the vessel as to occasion liquid drops thereof to be carried off with the steam, as well as the volatile and impure portions held in solution by the steam.

The vessel *a*, is charged from two-thirds to three-fourths full of oil, and the steam is admitted into the lower part of it through the pipe *c*, furnished with a stop-cock *d*; after acting upon the oil, the steam escapes through the safety-valve *e*, and is conducted by the pipe *f*, either into the chimney of the boiler, that supplies the steam to the vessel *a*, or else (for the purpose of taking advantage of the heat which it contains) into the jacket or outer casing *g*, of the vessel *h*, containing the next charge of oil, in order that it may be heated preparatory to its introduction into the vessel *a*; and with which oil, after it becomes hot, a saturated solution of lime is mixed, in the proportion of one part of lime-water to ten parts of oil.

At the bottom of the jacket *g*, is a pipe *i*, with a cock *j*, for drawing off the water produced by the condensation of the steam, and the liquid resulting from the condensation of the impure parts of the oil, into the receiver *k*; the contents of which may be drawn off, when required, by the cock *l*. From the upper part of the jacket *g*, an escape-pipe *m*, ascends, to prevent any confinement of waste steam in the jacket; and the end of this pipe is either carried into the chimney, or through the roof of the building into the open air. As the vessel *h*, and its contents, become gradually hotter, less steam will be condensed, and a greater quantity will have to escape through the pipe *m*.

When the oil is sufficiently purified, the cock *d*, is closed, and the cock *n*, opened, and the pressure of the steam in the vessel *a*, will force the liquid contents of that vessel through the pipes *c*, and *o*, into the receiving vessel *p*; if preferred, the pipe *o*, may be made to join directly to the bottom of the vessel *a*, as shewn by the dotted lines o^1, instead of branching off from the pipe *c*. As soon as the vessel *a*, is completely emptied, (which will be known by the steam following through the pipe *o*,) the safety-valve *e*, is opened, to allow all pressure of steam to subside; and then the fresh charge of oil is admitted into the vessel *a*, through the pipe *q*, from the vessel *h*.

When it is desirable to completely cool and condense those portions of oil which are carried away with the waste steam, a branch-pipe, furnished with a stop-cock, and leading to a refrigeratory pipe or worm, is affixed to the pipe *f*; the waste steam being then cut off from the jacket *g*, by a cock upon the pipe *f*, will pass through the branch-pipe into the refrigeratory pipe. In this case, the requisite heat is communicated to the contents of the vessel *h*, by admitting high-pressure steam, through a branch-pipe from the pipe *c*, into the jacket *g*; and the escape of steam from the jacket is regulated by applying a safety-valve to the pipe *m*.

After standing for some time, the water separates from the oil in the vessel *p*, and, subsiding to the bottom, is drawn off through the cock *r*, and thrown away; the oil is then run off into a filtering vessel, which may be of any suitable construction. The filtering-vessel, preferred by the patentee, (but he makes no claim thereto,) consists of a strong wooden tub, with a bottom three inches thick, in which a great number of holes are made, with a tapering borer, so as to be about two inches in diameter at the top, and only one inch at the bottom; these holes are stuffed up with cotton-wool, and the bottom is covered with a layer of saw-dust of oak, beech, or other hard wood, (but not of fir, or resinous wood,) about three inches thick; over this a coarse canvas is spread, and upon it a bottom of wicker-work is laid, to keep it steady. The oil is kept at a depth of four feet in the tub, in order that it may force its way through the filter of saw-dust and cotton.

For purifying fats and tallows, the same course is pursued as when oil is being operated upon, except as to the addition of lime-water.

The purification of the mineral oil or spirit, commonly called petroleum, or naphtha, or coal-oil, or spirit of coal-tar, is also effected by the operation hereinbefore described.—[*Inrolled in the Rolls Chapel Office, June,* 1841.]

To James Anderson, *of Newcastle-upon-Tyne, engineer, for improvements in windlasses.*—[Sealed 5th April, 1841.]

This invention is described by the patentee as consisting in "a new arrangement and combination of mechanical principles, applicable to a ship's windlass, for heaving the anchor, in conjunction with a winch for other purposes, to be made with or without the winch; that is to say, the windlass without the winch, or the winch without the windlass, or both windlass and winch in conjunction, as hereafter described."

On the ordinary barrel of the windlass two wheels are fixed, taking into and receiving motion from two endless screws, turned by suitable handles; and, to quote the patentee's own words, "the cogs of the wheels are cast so that the angle of the endless screw, applied as power, will bear and work right across the cogs, which I claim as new; whereas, in the ordinary way, where screws have been used, they have been cast with oblique or bevil cogs, so that the angle of the screw only bears on the centre of the cogs, which gives my method a great superiority in strength, and steadiness in working." Above the windlass barrel is a winch, supported in bearings at the upper parts of the windlass bitts; it is furnished with two screw-wheels, of the same description and pitch of cog as the screw-wheels before mentioned, and worked by the same endless screws; the weight-bar of the winch has a ratchet-wheel and pall at each end, to prevent the return of the "roll." The endless screws work in adjustable bearings, in order that they may be readily thrown into and out of gear with the screw-wheels; and, by this means, the windlass and winch may be worked together, or one at a time.—[*Inrolled in the Inrolment Office, October,* 1841.]

To GEORGE BENNETTS, *of Gunnis Lake, Cornwall, civil engineer, for improvements in steam-engines and boilers, and in generating steam.*—[Sealed 15th August, 1843.]

THIS invention consists, Firstly,—in the construction and arrangement of certain apparatus in connection with the engine and its boiler, for the purpose of rendering the steam which has been employed in working the engine, and is on its passage into the condenser, or into the atmosphere, available for heating the water from which the steam is to be generated; and, Secondly,—in generating steam by injecting small streams of water into generators clear of water, and maintained at such a temperature as to convert the water into steam, on its coming in contact with the surface of the generator.

In Plate VII., fig. 1, is a vertical section; and fig. 2, a plan of a condensing steam-engine. *a*, is the cylinder, with its piston-rod, slide-valve, and jacket; *b*, the eduction-pipe; *c*, the condenser; *d*, the discharge-pump, with bucket, cover, and discharge-cistern; *e*, *e*, represent a vessel formed of three cylindrical pieces, bolted together at the flanches 4, and 5, so as to make steam-tight joints. At each of the places where these pieces are joined there is an internal projection, which reduces the area of the vessel at that place, so as to allow only sufficient space for the water, at each stroke of the pump, to pass in a thin sheet between the outside of the eduction-pipe and these projections. The eduction-pipe passes through this vessel, and at the ends of the vessel where the pipe protrudes, a steam-tight joint is formed in the faucets 6, and 7. This vessel should be made capable of containing as much water as the engine will require to supply it with steam for eight or ten minutes; *g*, is a double-action forcing pump, connected at its eduction passage by means of the pipe *h*, with the vessel *e*, *e*; and at its induction passage by means of the pipe *f*, with the discharge-cistern *d*; *i*, is a pipe leading from the vessel *e*, *e*, to the generators or boilers; 8, is a valve, which should be kept open whilst the engine is in motion, so as to offer no resistance to the steam in passing from the cylinder; but when the engine is brought to a state of rest, this valve must be shut, and the steam in the cylinder allowed to pass into the eduction-pipe, where it will give out its heat to the water in the vessel *e*, *e*; this valve 8, may be alternately opened and shut by any of the gearing now in use for opening and shutting valves. The mode of action of this part of the invention is as follows:—If the vessel *e*, *e*, is filled with water, and the pump *g*, set in motion, the water which it forces into the vessel at *h*, will force an equal quantity of water out of the vessel, through the pipe *i*, into the generators or boilers; and the water, thus forced into the vessel at *h*, will circulate through it for eight or ten minutes, until, arriving at *i*, it is forced onwards into the generators or boilers, and during the time it has remained in the vessel *e*, *e*, will have taken up as much heat as the steam is capable of communicating; and the water, entering at the part of the vessel next the condenser, where the eduction-pipe is coldest, and being forced out of the vessel at the end next the cylinder, where the eduction-pipe is hottest, is forced at each stroke of the pump into a hotter position than that which it occupied before, whilst the area of the vessel at 4, and 5, being contracted, so as to allow only sufficient room for the water forced in by the pump to pass freely, prevents the water that has already passed through these places from returning. By these means, the steam which has been employed to work the engine will be available to raise the temperature of the water which is supplied to the boiler, and a partial condensation of the steam may also be effected; whereby less water than usual is required for condensing the steam in the condenser, and a smaller discharge-pump will effectually free the engine from water and air, thus leaving a greater available power in the engine, and at the same time economizing fuel. It will be seen, that, in the arrangement above described, the water is divided into several chambers or portions, and advanced from the coldest to the hottest part of the eduction or waste steam-pipe. The numbers or sizes of these chambers may be increased or diminished at pleasure, or made of such a size that each may contain the water required to be injected into the boilers or generators at each stroke of the engine, according to the other part of the invention. Further, the steam might be placed exterior to the water, the successive portions or compartments of the vessel to contain the water, being separated from, or connected with each other, by small orifices or communications, so as to prevent the hotter portions of the water from intermixing with the other or colder portions. It will be obvious also, that the steam might be contained between an interior and exterior series of vessels, or compartments, arranged respectively as above described. The patentee remarks, that he is aware of steam having been used, after it has performed its work in the cylinder, for the purpose of heating the water intended as a supply for the boiler; and he does not, therefore, claim the use of steam, after it has performed its work in the cylinders, generally, for the purpose of heating water, but only when applied according to the mode herein described.

The second part of the improvement consists, as before stated, in a mode of generating steam by injecting the water upon the surface of metal, raised to such a temperature as to convert such water immediately into steam. Fig. 3, is a vertical section; and fig. 4, a transverse section of the generators, with furnace, flues, &c. *k*, is the furnace door and frame; *l*, the ash-pit; *m*, the fire-place; *n*, *n*, furnace bars; B, is a flue leading from the fire-place to the back end of the generators *o*, *o*, *o*. The width of this flue is equal to the sum of the diameters of the generators *o*, *o*, *o*. On arriving at the end of these generators, opposite the furnace door, the flue turns upwards, and joins the flue C, formed by the arrangement of the generators, as shewn in fig. 4. This flue C, at the ends of the generators *p*, *p*, and *q*, divides, and, passing around the ends of them, enters the flues D, D. These flues meet at E, and proceed from thence to the chimney. The flues D, D, may be formed of brick or other suitable material. *o*, *o*, *o*, *p*, *p*, and *q*, are the steam generators, which may be made either of iron, or any other metal of sufficient strength to bear the pressure of the steam, and at the same time remain uninjured by the action of the fire. These generators are so connected at their ends by means of the pipes *t*, *t*, and *w*, and the branches A, A, as to form one continuous vessel; *y*, is a pipe leading from the water-heating vessel *e*, *e*, (figs. 1, and 2,) and through which the water passes into the generators *o, o, o,* through the branch 1, 2, 3, and the pipes *z,* placed in the interior of the generators *o, o, o*; one of these pipes is shewn in fig. 3. These pipes should project as far into the generators as the end of the fire-place *m,* and should be perforated throughout their lengths with a number of small holes. These pipes are also furnished with a flanch of the same size as the external diameter of the generators *o, o, o,* to the ends of which they should be fastened by means of an internal flanch, as shewn at the end of the generator *o,* where the pipe *z,* is shewn. The flanches of the pipes answer the two-fold purpose of confining the pipes in their proper position, and of closing the ends of the generators *o, o, o,* and may be removed, when necessary, for the purpose of cleaning the interior of the generators *o, o, o*;—*r,* is the pipe through which the steam is conveyed to the engine; and *s,* is the safety-valve.

The manner of using this part of the invention is as follows:—To provide steam for first starting the engine, a sufficient quantity of water should be placed in the generators for that purpose; and if the whole, or nearly the whole of this water is not used in starting the engine, no more water should be injected until it is exhausted. This may be ascertained by means of cocks, placed in the under sides of the generators *o, o, o.* When the water is exhausted, the force-pump *g,* (fig. 1,) should be allowed to inject, at each stroke of the engine, a sufficient quantity of water to supply the engine with a "stroke of steam." The water, entering through the perforated pipe *z,* is divided into a number of minute jets, which, coming in contact with the heated surfaces of the generators *o, o, o,* is converted into steam. This steam, entering through the branches A, A, of the pipes *p, p,* passes through them, and out at the opposite ends *v, v,* and through the pipe *t,* entering *q,* at *u,* from whence it proceeds to the engine through the pipe *r,* or, lifting the valve *s,* escapes into the atmosphere. The steam being made to pass through these generators, which are surrounded by the flues leading from the fire to the chimney, has its elasticity considerably increased, whilst the water is converted into steam (when thrown on the heated surfaces of these generators in such minute jets,) with less fuel than is used when a body of water is suffered to lodge in them. The fire by which the generators are heated may be regulated by any of the usual and well-known methods; care being taken not to overheat the generators, which ought never to be brought to a temperature approaching a red heat. To regulate the quantity of water to the demand of the engine, the chamber of the pump should be connected, above and below the piston, by a pipe, large enough to allow the water, which the pump is capable of raising, to pass freely through it. This pipe should be furnished with a stop-cock, the opening or shutting of which will regulate the quantity of water forced into the generators. In the event of water accumulating in the generators (which may be ascertained by means of the cocks in their undersides,) it should be withdrawn, or no more water injected until that is evaporated. In order to generate steam in the most economical and efficient manner, according to these improvements, the quantity of water injected at each stroke of the engine, should be that requisite for affording steam, of the quantity and elasticity required to work the engine at each stroke; the precise adjustments requisite for ensuring this perfect effect, being made according to the circumstances of the working of the engine and boiler, in each particular case.

The patentee lays no claim to the use of any of the several parts of steam-engines and boilers, hereinbefore described and referred to, except when the same are employed in and for the construction and arrangement of the apparatus for the heating of the water by the eduction of steam, and in and for the generation of steam, as above described.—[*Inrolled in the Rolls Chapel Office, February,* 1844.]

To CHARLES KÖBER, *late of No. 46, Leadenhall-street, in the city of London, but now of Leeds, in the county of York, cloth manufacturer, for improvements in fixing color in cloth.*—[Sealed 7th March, 1840.]

THIS invention consists, Firstly,—in the use of bichromate of potash as a medium for uniting the coloring ingredients, used in dyeing, with the wool, whereby a faster, brighter, and cheaper color is obtained, and is more effectually fixed in the cloth than by using the mordants generally employed, such as sulphate of iron and sulphate of alumina and potash, or, as they are commonly called, copperas and alum.

In consequence of the great affinity of bichromate of potash to the wool, as well as to the coloring ingredients, a comparatively small quantity of it will fix the dye-wares; that is to say, one pound of bichromate of potash can be used instead of from three to four pounds of alum or copperas; besides which, the color produced by the use of bichromate of potash is fast in alkalis and air, and better resists the operations of scouring, and the milling process employed in the manufacturing of cloth; and less coloring ingredients are required to be used than by the ordinary mode, because the color, produced thereby, being faster, no loss of color will take place when scouring the cloth with soap; and the fibres of the wool, in the dyeing of which bichromate of potash is employed, will not be injured, as they have hitherto been, by the acids contained in alum or copperas; and, on the contrary, the cloth will be softer, and easier to be scribbled and milled; and, consequently, the same quantity of wool will produce a greater and better quantity and quality of cloth than by the method usually employed.

The ordinary coloring ingredients are employed in conjunction with the bichromate of potash; and as every different shade and color requires a different proportion of ingredients, and the dye-wares differ so much in quality, that sometimes a double quantity of them is required, it is impossible to state the different proportions in which the bichromate should be used with them, the requisite amount varying according to the quantity of ingredients to be fixed in the wool; but the patentee generally employs three pounds of bichromate of potash for preparing one hundred pounds of scoured wool; and he sometimes adds two pounds of argal or tartar. In the liquor, thus produced, the wool is boiled for one hour and a half; and on the next day the color is filled up with as much of the coloring ingredients as the desired shade may require.

The second improvement consists in obtaining green colors perfectly fast in acids, alkalis, and air, by dyeing the wool blue, and then manufacturing the cloth from the blue wool, so as to make it what is called partly finished cloth, with a white or colored list, and then adding the yellow wares or ingredients to the cloth, instead of to the wool; by which means a perfectly fast green color will be obtained, similar in appearance to wool-dyed green, but much faster. Every kind of yellow ware may be used, but fustic is preferred; and in order to fasten the color, hydrochloric acid, saturated with tin, is used, to which is added as much water as will give the solution a specific gravity of 1·2612, or 30° Baumé; and of this solution from six to seven pounds is used for every one hundred pounds of cloth, besides the usual quantity of alum and argal. This solution could not be applied to wool in fleeces, as it would be destructive to the use of soap, and consequently to the milling process.

The last part of this invention consists in the use of soda and bran for dissolving the indigo in the vats for dyeing blue, whereby the indigo is better fixed in the wool, and at a less expense than is incurred by the use of woad, madder, and bran, which are usually employed for that purpose.

The soda is employed in the following manner:—In a seven feet vat the water is heated to 125° Fahr., and sixty-five pounds of bran, thirty-five pounds of common soda, (which has about 23 per cent. of carbonate of soda,) and four pounds of indigo, are thrown into it, together with the same quantity of lime as is usual for woad vats. The vat is worked from 110° to 118° Fahr., three or four times during the day, without stirring; and in the evening the vat is heated to a temperature of 125°, and into it is thrown about four pounds of lime, six pounds of bran, and five pounds of soda, with such an additional quantity of indigo as may be required for the following day; after this addition the vat is stirred as usual. If the vat has been working during the day, the above quantity of lime, bran, and soda, is added every evening, together with the requisite quantity of indigo. It would be difficult to state the exact quantity of indigo required, as any amount, from half a pound to twenty-five pounds, may be added, according to the shade of color required to be produced the following day. After proceeding in this manner for eight or ten weeks, the sediment is removed, and, with the liquor in the old vat, the operator sets a new vat, adding thirteen pounds of bran, and ten pounds of soda, with as much lime and indigo as may be required. The use of lime being to check the fermentation produced by the bran, it is impossible to state the exact quantity which may be required; but enough is used to check the fermentation in the vat to such a degree as will be sufficient to deprive the indigo of its oxygen, without an immoderate fermentation, which is very prejudicial. The vat, in which the soda is used, must be perfectly yellow; that is to say, the indigo must be perfectly deprived of its oxygen, or, as it is generally termed, the indigo must be "sprung," in which case the vat appears yellow. By the use of soda ashes, (which have about 46 per cent. of carbonate of soda,) instead of common soda, half the quantity will produce the same effect. Pearlash may likewise be employed, if the price will admit of it; and fine sharps may be used instead of bran.

The claims made by the patentee are, First,—the use of the bichromate of potash as a substitute for copperas, alum, and other mordants. Secondly,—the production of perfectly fast green colors, by dyeing the wool blue, and adding the yellow ingredients after it has been manufactured into cloth. Thirdly,—the use and application to indigo of soda and bran, or soda ashes and bran, either by themselves, or mixed with woad and madder; whereby the color is fixed in the wool better and cheaper than by the use of woad and madder alone.—[*Inrolled in the Inrolment Office, September,* 1840.]

To Edward Hammond Bentall, *of Heybridge, in the county of Essex, iron-founder and agricultural implement maker, for certain improvements in ploughs, and in apparatus which may be attached thereto for ascertaining the draught of instruments employed in tilling land.*—[Sealed 15th June, 1843.]

This invention consists of various novel modifications in the construction and adaptation of the working parts of ploughs, which may be enumerated under the following heads:—Firstly,—a peculiar means of raising or depressing the point of a plough-share, and nose of the breast, for the purpose of adjusting and regulating their operations, and adapting them to work in various qualities of land. Secondly,—in a novel construction of the parts by which the frame of the plough is connected to the sole or ground-plate. Thirdly,—an improved means of bracing the handles of the plough, to give them stability. Fourthly,—improved constructions of the "cat's-head" and brace attached to the head or draught end of a plough. Fifthly,—novel modes of attaching and adjusting the wheels of a plough, to suit it to different widths and depths of furrows; and Sixthly,—novel modes of attaching and adjusting the situations and positions of coulters to ploughs.

In Plate IX., fig. 1, represents a top or horizontal view of one of the improved ploughs complete, all the parts being constructed of iron; fig. 2, is an elevation of the same, the breast or mould-board being removed, and shewn only by dots; fig. 3, is a horizontal view of a portion of the plough, representing the sole or ground-plate, with the share attached, and also the lever connected therewith; and fig. 4, is an elevation of the same, some portions of which are shewn in section.

In fig. 4, *a, a, a,* is the frame of the plough, to which is attached an adjustable lever *b,* with the share *c,* affixed thereto, for the purpose of having its point raised or depressed, as may be required, which is effected upon the same principle as described in the specification of a patent granted to the present patentee, and dated 10th June, 1841.*

It has been found by experience, that in the patentee's former construction of plough, in some instances, on depressing the point of the adjustable share *c,* below the horizontal line of the sole, the earth insinuated itself between the nose of the breast and the adjustable lever *b;* and that on raising the point of the share *c,* again to the horizontal position, the nose of the breast was occasionally broken off, by the pressure or resistance of the earth between it and the point of the lever. To remedy this defect, the nose part of the breast is now formed of a distinct piece *d*, (see figs. 2, and 4,) from the upper part of the breast; which, owing to its firm attachment to the lever *b*, by a nut and bolt *e*, prevents the abovementioned inconvenience. Figs. 5, and 6, shew the manner of constructing the adjustable lever *b*, for a double-breast plough, and the way in which it is connected to the frame for raising and depressing the point of the share. Fig. 5, is a horizontal view, and fig. 6, an elevation, representing the frame *a*, *a*, the adjustable lever *b*, and the share *c*; the lever *b*, in this instance, is attached to the frame by a horizontal bolt *z*, which constitutes its fulcrum; the end of the lever is of a spade form, and is bolted to the share by a pin and nut *y*.

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* For description of this invention, see Vol. XXI., p. 12, Conjoined Series.

The improved method of constructing the sole or ground-plate of a plough, for the purpose of connecting it to the frame, is shewn in figs. 2, and 4, *a*, *a*, being the frame, and *f*, *f*, the sole or ground-plate. Upon the upper surface of the ground-plate blocks *g*, *g*, are cast, with a vertical pin in each; which pins, when passed through corresponding eyes in the lower part of the frame, and made fast by nuts, connect the sole and frame firmly together. This improvement prevents the inconvenience of the heads of connecting-bolts being worn away by friction, as heretofore.

An improved mode of bracing the handles of ploughs is shewn in fig. 1, and consists in forming a truss of wrought-iron bars, as shewn at *h*, *h*, which are united in the middle at *i*, by a strong rivet, and are attached, at their ends, to the arms of the plough, by similar fastenings.

The improved modes of constructing the "cat's-head" of a plough, for determining the direction of the draught, are exhibited under two modifications, in figs. 1, and 2, and figs. 7, and 8. In the first of these plans, *k*, *k*, represents the beam of the plough, having a forked end, to which fork two segmental plates *l*, *l*, are affixed, in horizontal positions. These plates are perforated with two series of holes, as seen in fig. 1, for the purpose of fixing, by a vertical pin *m*, the position of the hake *n*; which hake turns upon a pivot at *p*.

The ends of the plates *l*, *l*, are held and firmly braced in their positions by a lateral rod *q*, bolted to the beam and frame; which lateral rod also affords considerable stability to the beam when the draught is in an oblique direction. The other modification in the construction of the cat's-head of a plough, is shewn at figs. 7, and 8; fig. 7, being a horizontal representation of the contrivance; and fig. 8, a vertical view of the same. The beam of the plough *k*, has, in this instance, a horizontal segmental groove or slot *r*, formed in an arm *z*, at its end; in which slot a vertical pin is inserted. This pin is readily adjusted and fixed in any part of the segmental arm, for the purpose of giving any required angle to the draught, by means of nuts *t*, *t*, screwed tight above and below. At the lower part of the pin *s*, an eye is formed, through which the draught-rod *u*, passes. One end of this draught-rod is connected to the beam by a swivel and bolt, and the other end of the rod, beyond the eye, carries the staple to which the ordinary draught-chain is appended; the nuts *t*, *t*, being moveable up or down the pin *s*, allow of the draught being taken at any point of depression below the beam.

The improved mode of effecting the adjustment of the wheels of ploughs, to suit different depths of ploughing, and different widths of furrows, is shewn in the drawings, at figs. 9, and 10. An elevation of the wheels, and their improved appendages, as they would appear when seen from the back of the plough, is represented at fig. 9. The beam of the plough is shewn partially at *k*. A peculiarly-formed bracket *v*, is affixed to the beam by a bolt and screw-nut, and in this bracket a pin *w*, is inserted, upon which the yoke *x*, swings freely. The running-wheels turn upon studs, extending from the lower ends of vertical rods *y*, *y*; which rods pass through sockets *z*, *z*, attached to the yoke *x*, by bolts and nuts. Long slots in the yoke admit of the sockets being slidden laterally for adjustment, and in order to fix them at any required distance apart, so as to regulate the wheels to suit different widths of furrows; and in the event of the wheels passing over irregular surfaces, the yoke, which carries the wheels, will vibrate, as shewn by dots, allowing the plough to pass, without deviation, through the ground in its proper direction, and at its determined depth. In order also to regulate the height of the beam of the plough, the vertical arms *y, y,* may be adjusted by being slidden upwards or downwards in the sockets *z, z,* and are made fast thereto by the screw-bolts at the desired elevation. Fig. 10, represents a differently formed yoke *x, x,* capable, like the former, of turning upon a pin *w*; but in this instance, instead of sliding the bolts of the sockets in long slots, as before, the sockets *z, z,* for carrying the vertical arms *y, y,* are clamped upon a solid yoke, and made fast thereto by screws.

The improvements in attaching and adjusting the coulters of ploughs consist in applying peculiarly constructed adjustable sockets, boxes, or clips, to the beam of a plough, in which the coulter is to be held, and by the adjustment of which the position of the coulter may be changed, as circumstances may require. Fig. 11, represents a portion of the beam of a plough, *k,* with the socket or box A, attached thereto, and carrying the coulter B; fig. 12, is a horizontal view of the same. A long curved slot is cut in the beam of the plough, and a block or rib at the back of the socket A, fits into and slides in this curved slot, by means of which the socket may be moved to any part of the beam. Within the extent of the long curved slot, a pin or bolt C, with an eye at its front end, is passed through the centre of the socket A, and in this eye of the bolt C, the shaft of the coulter B, is inserted; and the socket, with the coulter, is made fast to the beam, in any required position, by a washer and nut D, screwed up tight against the beam. By these means, the coulter may be placed at any distance before the point of the plough-share, at various angles to the perpendicular, and its point may be raised to any required height from the bottom of the furrow.

If it should be desired to place the point of the coulter nearer to, or farther from the land side of the plough, a small wedge, inserted between the socket A, and the stem of the coulter B, as shewn in fig. 12, may be driven in more or less, which will effect that object.

In figs. 1, and 2, another modification of this contrivance is represented, adapted to the beam of the plough, in which a clamp A, sliding upon the beam, carries the coulter by means of two pins or bolts c, c, each having an eye, through which the stem of the coulter passes, and the coulter is made fast thereto by nuts upon the ends of the pins being screwed up tight against the beam.

The improved apparatus for ascertaining the draught or amount of resistance opposed to any plough, or other instrument employed in tilling land, is shewn at figs. 13, and 14; fig. 13, being an elevation of the machine; and fig. 14, a view of the same, looking upon it from above. *a, a,* is a horizontal frame of iron, constituting the carriage of the apparatus, upon the arms of which frame there are attached adjustable sliding sockets, *b, b.* Into these sockets, respectively, are inserted the vertical rods *c, c,* having studs at their lower extremities for the running wheels *d, d,* to revolve upon, as their axles. Hence it will be perceived, that the distance of the wheels apart, and also the height of the carriage from the ground, may be determined at pleasure. An arch or standard *f,* affixed to the frame *a, a,* carries the axle *e,* of a double-armed lever *g*; and an horizontal rod *h,* slides in sockets or apertures formed in the ends of the frame *a, a*; which rod has a spring *i,* to keep it back in its quiescent position when not acted upon. The lever *g,* and rod *h,* are connected by a link *j,* and a stem *k,* which rises from the rod *h*; and hence, when the rod *h,* is drawn out at the left-hand end of the carriage, the lever *g,* is made to move upon its axle *e,* and to depress a vertical rod *l,* attached to its upper extremity. The upper end of this rod is bent over, and connected to the rod of a piston, working in a vertical tube, enclosed within a wooden casing *m,* which casing, with its tubes, &c., is shewn upon an enlarged scale, in the sectional fig. 15. In this casing there are two vertical tubes, *n,* and *p,* containing mercury, and having a communication for the passage of the mercury from one to the other, through a contorted channel in the plate *q.* The rod of the piston *r,* is jointed to the rod *l,* and hence, as the lever *g,* is moved upon its axle, the rod *l,* and piston *r,* will be made to rise and fall with its vibrations; and when the piston descends in the tube *n,* the mercury will pass from that tube up the tube *p,* through the contorted passage in the plate *q,* and a column of colored spirit, oil, or water, on the top of the mercury in the tube *p*, will, by these means, be forced up the small glass tube *s*, and there indicate, by the graduated scale *t*, on the casing, the average draught or force applied to the end of the horizontal rod *h*.

Fig. 16, represents the under side of the plate *q*, and shews the form of the contorted passage, which is so made for the purpose of preventing the mercury passing with too much rapidity from one tube to the other.

The operations of this dynamometer will now be understood by a very slight further description:—Let the head of a plough be attached to the draught staple *v*, and the horses to the eye of the horizontal rod *h*, at the reverse end; according to the resistance, so will the rod *h*, be slidden forward in its sockets, and through the connections *j*, and *k*, the upper end of the lever *g*, will be depressed; thereby causing the vertical rod *l*, and piston *r*, to descend, and act upon the mercury in the tubes, so as to raise the column of spirit in the glass tube, as described.—[*Inrolled in the Petty Bag Office, December*, 1843.]

Specification drawn by Messrs. Newton and Son.

To William Tindall, *of Cornhill, in the city of London, ship-owner, for a new and improved method of extracting or manufacturing, from a certain vegetable substance, certain materials, applicable to the purposes of affording light, and other uses.*—[Sealed 19th January, 1842.*]

This invention consists, Firstly,—in expressing cocoa-nut oil, of various degrees of consistence, from copperah, (which is the kernel of the cocoa nut, cut into pieces, and dried abroad in the sun); and Secondly,—in producing from the residue of the copperah, when pressed, a sweet and fresh cocoa-nut oil-cake, for feeding animals and poultry.

The method adopted by the patentee, for importing copperah into this country, in a perfectly fresh state, is to pack it closely in large iron tanks, filling up the interstices between the pieces by pouring in cocoa-nut oil, which is in a liquid state at the ordinary temperature of Ceylon and other parts of India; the iron covers of the tanks are then screwed down upon listings, dipped in tallow, and the contents are thus protected from the action of the atmosphere. On arriving in this country, if it is in the summer time, the cocoa-nut oil will most likely be in a liquid state, and will then run freely off the copperah, as it is being ladled out of the tanks; but in cold weather the oil will be congealed, and form, with the copperah, a solid mass, which will have to be cut in pieces, in order to get it out of the tank; these pieces are thrown into a slightly heated metal vessel, contained in a hot room; and the oil being, by this means, brought to a liquid state, the copperah can be ladled out of the vessel.

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* This is the patent referred to in the application for an extension of Soames' patent, at p. 464, in Vol. XXIII., of our Conjoined Series.

The patentee's method of operating upon the copperah now commences:—It is first cut into small pieces by notched rotary knives; then ground very fine by edge-stones or runners; and after that it is spread with a trowel, in layers of an inch thick, upon mats, about two feet square, made of coir-yarn. Each layer should contain about seven pounds of the ground copperah, and upon the top of the layer another mat is spread; a number of these packages are then placed, one above another, in a hydraulic press, (the bed of which they exactly fit,) with an iron plate, one quarter of an inch thick, and two feet square, inserted between each package and those above and below it. In the first place, whether it be in summer or winter, the pressure is applied slowly and gradually to the packages, in a room, the temperature of which is the same as the external atmosphere; and the oil, thus expressed, is received in cans at the bottom of the press. When this oil ceases to flow, the temperature of the room is raised, and the pressure being continued, a further portion of oil is extracted; the temperature of the room is then again increased, and the operation proceeds in this manner until, by a final pressure, at a temperature higher than 120° Fahr., nearly the whole of the remaining oily matter is expressed; the packages are then taken from the press, and the mats removed from the residue of the copperah, which is now a dry cake, suitable for feeding animals and poultry. After this, the oil may be purified by filtration through cotton or woollen bags; or it may be kept, for a short time, in cisterns, placed in a hot room, until the impurities settle.

If the portions of cocoa-nut oil extracted from the copperah, at the different stages of temperature above referred to, are kept distinct and separate, their consistence will be found to vary with the temperature at which each portion is expressed, that portion being liquid which is expressed at the lowest degree of temperature, whilst each of the other portions increases in consistence with the higher degree of temperature in which the copperah is acted upon. Thus, the oil obtained by the first pressure, at the temperature of the atmosphere, will remain in a liquid state at such temperature, and any higher degree thereof; so that, if the oil is extracted in the winter, when the copperah and the atmosphere are at 40° Fahr., it will remain fluid at that, and at higher temperatures; while the oil produced by the last pressure, at a temperature exceeding 120° Fahr., assumes a considerable degree of solidity and consistence.

The patentee, in conclusion, states, that, in his method of expressing cocoa-nut oil from copperah, at different stages of temperature, he does not claim the particular process of hydraulic or any other kind of pressure; nor the invention of the coir-yarn mats; nor the mode of placing them in the bed of the hydraulic press: but he claims the application of such pressure, and of the above-mentioned process, to the article called copperah; and the expressing, in this country, from such copperah, at separate stages and at different degrees of temperature, cocoa-nut oil of various degrees of consistence. He also claims the two products thereby obtained from such copperah: viz., First,—a good, fresh, and sweet cocoa-nut oil, varying in its consistence according to the degrees of temperature at which the copperah is subjected to pressure,—that portion of cocoa-nut oil which runs from the copperah when it is pressed at any given temperature being fluid at that, and any higher temperature, and being adapted, at such, or any increased temperature, either alone or in combination with other oils, for burning in lamps, and other uses; while that portion of cocoa-nut oil which is of considerable consistence, may be used in combination with other substances, such as tallow, tallow stearine, stearic acid of tallow, spermaceti, and wax, for making candles, and may be used, either alone or in combination with other substances, for other uses; and Secondly,—a sweet and fresh oil-cake, which is fit for feeding various kinds of animals and poultry. —[*Inrolled in the Inrolment Office, July,* 1842.]

To Robert Hicks, *of Old Burlington-street, in the county of Middlesex, surgeon, for his invention of certain improvements in apparatus for impregnating liquids with gases.*—[Sealed 11th February, 1843.]

In describing this improved apparatus for impregnating liquids with gases, the patentee commences with the generator, in which the carbonic acid gas is disengaged.

The generator is a cast-iron cylinder, an inch thick; its upper and lower edges have flanges, to which the top and bottom of the cylinder are bolted. This cylinder is lined with lead, the seams of which are burned together, instead of being soldered; the edges both at top and bottom of this leaden cylinder are turned back, so as to overlap the flanges of the iron cylinder, and a leaden top and bottom are laid over them, of sufficient diameter to cover the flanges.

Into the upper part of this generator is fitted a leaden cullender, perforated throughout with small holes, on which lumps of carbonate of lime are placed, for the purpose of saturating any hydrochloric acid that might otherwise pass over into the receiver (hereafter mentioned) with the carbonic acid gas, when that acid is made use of.

In the centre of the generator an agitator is mounted vertically, one end of its shaft projecting through the lid, and the other end sinking into a leaden socket, fastened to the bottom. On to the end of the shaft of the agitator, projecting through the lid or top, a winch handle is fixed. A stuffing-box is introduced into the hole in the centre of the lid or top, for the upper part of the shaft to work in. To one side of the shaft, near to its bottom or lower extremity, is fixed a paddle-board, covered with lead, with its face looking obliquely upwards, so that when the shaft is made to revolve, by turning the handle, it may sweep up the carbonate of lime, thus effectually mixing it with the acid employed for generating or disengaging carbonic acid gas. The shaft and paddle-board of the agitator are constructed of wood.

Connected to the generator is a small glass pump (packed with asbestos), for pumping the hydrochloric acid into it; its ejection-pipe passes into the lower part of the generator, and may convey at each stroke of the pump about four ounces of acid; and if the hydrochloric acid of commerce, sp. gr. 1.1060, is used, about 485 inches of carbonic acid gas will be disengaged from the carbonate of lime, by the action of the said four ounces of hydrochloric acid thrown in by every full stroke of the pump.

A pressure-gauge of ordinary construction is connected to the generator; its object will be readily conceived by practical men, therefore no further explanation of its use and action is necessary.

A leaden tap is introduced, and securely fixed into and near the bottom of the generator, for the purpose of drawing off the chloride of calcium, or muriate of lime, or other residuum, when in a fluid state, from time to time, as may be required.

The receiver, containing the water, common soda water, or other fluid to be impregnated with carbonic acid gas, is connected to the generator by means of a leaden or other suitable pipe, which passes off from the upper part of the generator, and enters the receiver near to its bottom; terminating in a rose, full of small holes, similar to the rose upon the spout of a common watering-pot.

The receiver must be made of iron or other suitable material, of sufficient strength to bear the pressure of from six to eight atmospheres, or more, and may be lined with tin. A pressure-gauge is connected to the receiver as well as to the generator. A common force-pump is also attached, in order to pump water or other fluids into it; the spout, or ejection-pipe of the said pump terminating by a rose, similar to the one before described, except that the holes in it are rather larger; it enters at the upper part of the receiver, so that the water or other fluid may shower down upon the gas when the pump is in action.

When five atmospheres of carbonic acid gas, more or less, as may be intended, and indicated by the pressure-gauge, are allowed to pass into the receiver from the generator, the water, or other fluid that may be used, is introduced into the vessel in the manner above explained.

In the receiver a common wooden agitator is mounted, one end of its shaft projecting into a socket made of tin, and fastened in the centre of its bottom, and the other end of the shaft passing through a stuffing-box, which is fitted and made secure in the top of the receiver. On the end of the shaft projecting through the stuffing-box, a winch handle is fixed, for revolving the agitator when required.

The improvement in the bottles made for containing aerated water, common soda water, or other fluids impregnated with carbonic acid gas, or any other gas or gases, is as follows:—The improved bottles are of two different sizes; the larger are made of green glass, the smaller of flint glass, white or coloured, and common green glass. The larger may hold about three gallons, and the smaller ones about ten ounces or half a pint. The former are denominated "Reservoir Bottles," and the latter "Portable Bottles," and both are constructed upon similar principles. The reservoir bottles, when made of glass, are of a spherical form, and very stout, the glass being nearly an inch thick in every part of the globe of the bottles; but the patentee proposes to manufacture some of the reservoir bottles of sheet-iron, and to enamel their insides, in which case their form may vary, but due regard must be had to their strength; in this case they are made in two parts, with flanges, between which a leather or other suitable washer is placed; the two parts are fastened together by screws or other suitable means. Tin vessels, put together in the same way, might answer the purpose, or copper ones, lined with tin in the same manner as the receiver. The portable bottles, when made of green glass, are of the which the aerated water or other fluids pass; this tube or spout, after passing from the cap horizontally two or three inches, is bent downwards at an angle of about forty-five, and terminates in a conical-shaped extremity, with its base at the end, and about an inch long, thus forming an open mouth for the reception of the end of the pipe, through which the bottle is filled by the receiver, and into which also a corresponding tube, connected to the cap covering the mouth of the portable bottle, and forming its spout, is inserted, when it is intended to fill the said bottle with aerated fluid, of any kind, from the reservoir bottle. To the upper part of the plug a collar is attached, in order to prevent it falling from its seat when not maintained there by the pressure of gas contained in the bottle. The apex of the plug is cube-shaped, over which is applied the corresponding hole in the key or wrench for turning the plug, so as to bring its lateral hole in correspondence with that of the cap when it is wished to draw off the contents of the bottle, and in the contrary direction when it is desired to cut off the supply. Under this arrangement, the tube that passes into the bottle, nearly to its bottom, is screwed or fastened into the base of the plug, instead of being screwed into the cap as under the former arrangement.

In the third variety of combination for forming bottles, a conical plug is introduced into the upper part of the cap, and forms a valve there, opening inwards. The valve is kept closely shut by the pressure of the gas in the bottle, when it contains aerated water, or any other fluid impregnated with gas; and it is opened by depressing the conical plug, which has a rod or wire attached to its apex, that passes upwards through a hole in the centre of the cap, and terminates in a button, sufficiently strong to bear the requisite pressure for overcoming that of the gas in the bottles. There is a hole in the side of the cap, which has free communication with the inside of the bottle, when the plug is pushed down by depressing the button. This communication takes place through the tube that passes to nearly the bottom of the bottle, and is screwed into a tin or silver plate, which rests upon the top of the bottle. There is a small coil of wire, forming a spring, which passes round the rod, above the top of the cap, reaching to the button by the elastic force of which the plug is maintained in its seat when the aerated water or other gaseous fluid is drawn off from the bottle. The tube or spout connected to the side of the cap, is similar to that described in the former arrangement.

In the fourth variety of combination for forming bottles, a cylindrical plug is introduced into the upper part of the cap, and forms a valve, which opens outwards: three-fourths of the length of the plug is situated above the side hole in the cap, and its lower fourth projects below the said hole when the valve is shut. On to the bottom of the plug a piece of leather is fastened, by means of shell-lac or other cement, and when the plug is seated, which is the case while the valve is shut, the leather is pressed upon the central hole in the tin or other suitable plate that rests upon the top of the bottle. The tin plate receives the tube that descends into the bottle, in the same way as under the former arrangement. Over this plug a spring is placed, formed of a coil of stout iron wire, which is inclosed in the upper part of the cap.

The plug or piston is raised by means of a lever, its long end forming a handle, and its short end, which is hook-shaped, passing through a hole in the side of the cap, lodged in a niche made in the plug. There is a projection cast on the side of the cap, as a fulcrum for the lever.

By depressing the handle of the lever, the plug or piston is raised above the hole in the side of the cap; the aerated water or other fluid impregnated with gas, now escapes through the tube in the bottle, and passes off through the spout connected to the side of the cap, in the same manner as under the former arrangement.

The last improvement refers to a method of using the common soda-water bottle. Into the mouth of this bottle a cork is introduced for about half its length, the other half being screwed into a cap similar to those placed over the mouths of the bottles before described.

Throughout the whole length of the cork, in its centre, a hole is perforated, large enough for the reception of a tin or other suitable tube, about a quarter of an inch in diameter.

This tube has a flange at its lower end for supporting the bottom of the cork, and a nut is screwed over its mouth, resting upon the cork, thus together fastening the tube into the cork. Into the lower orifice of this tube a piece of solid tin is fixed, in which the seat of a conical valve is formed, with its base downwards, or the tube itself may be formed out of solid tin, or other suitable material, by boring it, and the seat of the valve may also be formed in it. To the apex of the valve a wire is fastened, which passes upwards through the tube, and terminates in a screw, upon which a small nut is placed. A spring made of iron, plated with silver, encircles the wire above mentioned, from nearly the bottom to the top of the tube. The lower end of the spring rests upon the top of the piece of metal in which the seat of the valve is formed, and its upper end is confined within the tube by the small nut aforesaid.

Into the female screw of the mouth of the cap a tin tube, about two inches long, is screwed or otherwise fastened, through which a smaller tube or spindle passes, and is screwed or fastened upon the wire, its upper end projecting two or three inches above the larger tube. The object of this last-mentioned tube is to lengthen the wire connected with the valve, so as to keep the mouth of the bottle at a distance from the bottom of the glass, while the contents of the bottle are escaping, when the valve is opened by pressing the end of the small tube upon the bottom of the glass. The fluid escaping through the valve, passes out between the tube and spindle of the valve, into the glass or other vessel receiving it, that being small, to allow the fluid to pass.

When it is intended to fill the bottle, the tube and spindle just described must be disconnected, by unscrewing them, and an adopting piece must be screwed or otherwise connected to the cap, with a mouth-piece similar to those of the bottles already described, whereby it is attached to the mouths of the reservoir bottles or receiver, as may be required.

The patentee claims the combination of the generator, receiver, and bottles, above described, whereby aerated waters are manufactured, and used with more facility and safety than has heretofore been done. Secondly,—the combinations which make up the bottles hereinbefore described. Thirdly,—the combinations which make up vessels for containing carbonic acid in a liquid and gaseous state, and which said vessels are portable.—[*Inrolled in the Petty Bag Office, August*, 1843.]

To RICHARD ARCHIBALD BROOMAN, *of* 166, *Fleet-street, in the city of London, Gent., for the manufacture of paper, cordage, matting, and other textile fabrics, from certain vegetable matters not heretofore made use of for that purpose; as also for the application of the said materials to the stuffing of cushions and mattresses,—being a communication.*—[Sealed 10th August, 1843.]

THE first part of this invention consists in manufacturing paper, cordage, matting, and other textile fabrics, from the *convolvuli* of the *Cistus* genus or family of plants, abounding in English, French, and Dutch Guiana, the West India Islands, the Brazils, on the coast of Africa, and other parts. All the plants of this order may be used; but the *Mimosa scandens*, the *Guidandina bandue*, and the *Ledum*, or marsh bindweed, are preferred.

The stems of these plants are stripped of the bark, and beaten or bruised to separate the fibres, which are then dried, for the purpose of extracting the sap, and afterwards boiled for three or four hours with a suitable quantity of American potash. After this, the fibres are washed, and then bleached, by immersion in hydrate of chlorine for three or four hours, or by any other means; and if a greater degree of whiteness should be required, they are next boiled with soda, washed, and steeped in water saturated with slaked lime. The fibres are then combed with a metal comb, and reduced, by pounding, to a pulp, which is ready to be made into paper in the ordinary way, either alone, or in combination with any other material.

The bark of these plants may be also converted into pulp by the above processes; the epidermis or outer covering being first removed. The plants known in the West India Islands by the name of *herbes coupuntes*, and the bark of the West Indian pear-tree (*poirier*), may likewise be rendered suitable for making paper, by operating upon them in the manner above described, but omitting the combing process.

The plants are prepared for making cordage, matting, and other textile fabrics, by reducing them to filaments in the above manner, then soaking, and afterwards submitting them to the same processes which hemp and flax undergo. The second part of the invention consists in employing the fibres of the above plants for stuffing cushions and mattresses, after they have been treated in a manner similar to that described for making paper, except the bleaching process, which is, in this case, unnecessary.

The patentee claims, Firstly,—the manufacture, in the manner before described, of paper, cordage, matting, and other textile fabrics, from the several vegetable matters above mentioned; and Secondly,—the application of the said vegetable matters, in the manner before described, to the stuffing of cushions and mattresses.—[*Inrolled in the Inrolment Office, February*, 1844.]

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 136, Vol. XXIV.)

SESSION, 1844.

January 9.

The PRESIDENT in the Chair.

"Description of the cast and wrought iron trussed-girder Bridge on the line of the Bishop Auckland and Weardale Railway." By John Storey.

The author states, that his attention has been long directed to the expensive construction of the brick and stone bridges usually erected over and on the line of railways, and the apparent want of durability in the timber bridges, which have in some instances been substituted; as well as to the cast-iron bridges, which have generally been constructed in situations where the height between the top of the rails and the level of the roads which they span, was so limited, as not to admit of a stone or brick arch. In the latter cases, cast-iron girders have been employed, but their great weight has rendered them expensive, and has obliged the abutment piers for supporting them to be very substantial.

In order to obviate these objections, the author has introduced combinations of cast and wrought iron in forms, which he contends may be advantageously adopted for occupation bridges, or even for carrying the railway, and that they may be constructed at a less cost than stone, brick, or even timber bridges.

These bridges consist of longitudinal and segmental girders of cast iron, abutting against each other at the ends, secured together by bolts and nuts through the flanges, and resting on masonry abutments: a system of wrought-iron tie-trussing is then applied, and struts are placed at certain distances where they are requisite. As many of these principal trusses are used as the strength of the bridge demands, and they are connected by transverse braces and distance pieces of cast iron, thus preventing undue outward pressure: sockets are cast upon the girders, to receive the timber joists, and the platform is covered with Dantzic deal planking, spiked to the joists. The wrought-iron struts at the top clasp the girders, to which they are also firmly bolted, and their lower extremities pass through the truss, so that, on the nuts being screwed up, the truss is brought to its proper degree of tension, and being made sufficiently strong to bear the weight calculated for the bridge, independent of the segmental girders, the weight and strain are brought upon the abutments in the most favourable manner.

Bridges thus constructed do not require any centering for their erection, as each side may be put together near the spot, and by means of purchases, may be lifted entire on to the abutments; or the whole bridge may be put together before the earth is excavated from between the abutments, excepting only as much as is necessary for receiving the trussing.

The dimensions are given of occupation bridges, calculated to bear 8 tons, which is stated to be a greater weight than is required by the landowners. The total weight of cast and wrought iron in an oblique bridge of a span of 86 feet 3 inches, and 18 feet wide, is 11 tons 7 cwt., and that of a square bridge of 106 feet 6 inches span, is 14½ tons: their total cost, including excavating the ground, the masonry, stone penning on the sides of the excavations beneath the bridge, the timber work, and the painting, was, for the former £280, and for the latter £342. These sums are stated to be much less than the expense of similar bridges of stone, or even of timber.

A design is given of a stronger kind of bridge, of similar construction, for carrying two lines of railway. The span is 90 feet, and the width 22 feet, between the side railings: the weight is 43 tons, and the total cost, including the masonry, is estimated not to exceed £1200. It is calculated to bear about 50 tons, which is as much as could be brought upon it by any passing train.

The author proposes to adapt this system of construction to bridges for crossing rivers, &c., in order that, by the lightness of the piers, and their having to bear only a vertical thrust, the water-way may be less impeded than it is at present by the usual heavy stone structure.

A design is also submitted for a bridge to consist of parallel cast-iron girders, trussed with wrought-iron bars, in such a manner, as to convert the depth of the girder into a strut, the weight of the passing load being entirely resisted by the tensible strain of the bars.

The author does not claim the introduction of wrought-iron trussing for cast-iron girders, as he is well aware of its being constantly practised; but he believes that it has not been commonly done to the extent which he proposes; and being satisfied of the practical utility of the system, he was desirous of bringing it more prominently under the notice of engineers through the medium of the Institution, and also of inviting discussion upon the plan, one great merit of which is, that it uses a material produced better and cheaper in this country than elsewhere, and assists one of its staple manufactures, which is at this moment much depressed.

The communication is accompanied by five drawings of bridges, fully illustrating in detail the various modes of construction treated of.

Captain Moorsom stated, that occupation bridges of 60 feet span by 18 feet in width, could be constructed of timber for £5 per lineal foot, including the cost of the excavation, the masonry of the abutments, &c.; that up to 90 or even 120 feet span, the expense would not exceed £4 per foot. He preferred timber bridges for railways, not only on account of their simplicity and the facility of repairing them, but also because a good deal of the small timber, which would otherwise be wasted, or used at a loss, might be made available for such bridges, and thus a further expenditure for materials was avoided.

Mr. Grissell was also of opinion, that timber bridges could be constructed more cheaply than those of iron, as recommended in the paper. So much wrought iron would, he apprehended, materially increase their cost.

"Description of a cast-iron Bridge, completed in the year 1840, for carrying the Birmingham and Gloucester Railway over the River Avon, near Tewkesbury." By Captain W. S. Moorsom, Assoc. Inst. C.E.

This bridge is situated about seven miles north of Tewkesbury: the approaches to it are formed on embankments nearly 25 feet high, crossing the valley nearly at right angles. In its construction it was desirable to provide for the effect of considerable floods, by aiding the egress of the water, and also to avoid any interference with the navigation of the river; a greater width of water-way was therefore given than at first view may appear necessary.

The bridge consists of three segmental arches, each of 57 feet span, with a versed sine of 5 feet 2 inches: the length between the centres of the piers being 66 feet 6 inches; the total width between the abutments 190 feet 6 inches; and the breadth of the cutwaters 8 feet 6 inches each, leaving a clear water-way of 173 feet 6 inches.

The principal novelty in the work is the method of constructing the two piers. They are formed externally of cast-iron plates or caissons, filled for the first twelve feet from the bottom with solid masonry or concrete, upon which is built hollow masonry to support the cap-plates, which carry eight pillars on each pier, with an entablature, to which are attached the ends of the arches, which, with the caps, pillars, and entablature, are of cast iron. The abutments at either end are of masonry.

The caissons are, at the bottom, 41 feet 6 inches long, and 16 feet wide, with semicircular ends, tapering upwards for 12 feet, on all sides, to 34 feet 6 inches long, by 8 feet 6 inches wide, from whence they rise perpendicularly for the remaining 8 feet 9 inches. They are constructed of cast-iron flanched plates, ¾ in. thick, screwed together by bolts, and the joints made with iron cement. The total weight of each caisson is about 28 tons.

The bottom of the river at the site of each pier having been prepared by a scoop dredger, worked from a platform erected upon piles, the lower row of plates for the caisson was put together, and suspended in the water by iron rods, while the other rows were added, gradually lowering the whole as the work proceeded, until the bottom rested on the bed of the river. A quantity of clay was then thrown round the outside, which formed a joint so impervious to water, that with two pumps, each of 5½ inches square, the caisson was emptied in six hours, and was afterwards kept dry by one pump, which was worked occasionally during the subsequent excavations withinside the caisson.

The dimensions of the cast-iron work of the arches, and the masonry of the abutments, are given in detail, with an account of the methods of construction followed, and of the materials employed.

It is stated that these iron caissons, which were prepared by Mr. Ward of Falmouth, the resident engineer, were found to be cheaper than having coffer-dams and stone piers. The total cost of the bridge, including iron-work and painting, masonry, subsequent repairs to the walls, and superintendence during construction, being £10,192, and the weight of cast and wrought iron employed was about 520 tons.

The partial failure of an arch in one of the abutments is described, and the supposed reasons for the sinking are given, with the means which were adopted for replacing those stones which had been displaced, and it is stated that no sinking had since occurred.

The paper is illustrated by eighteen remarkably well executed drawings by Mr. Butterton.

Captain Moorsom said that there were a few interesting particulars relative to the bridge beyond those which were given in the paper. Mr. Murchison shewed, in his work on the Geology of the Silurian districts, that the deposits of gravel of the Lickey range of the hills nearer to Birmingham, and that of the Avon near Pershore, were, geologically speaking, identical; but Captain Moorsom found that, as regarded the engineer's operations, they differed in character.

The gravel in the neighbourhood of Birmingham was remarkable for the rounded character of the stones composing it, whereas that which was found in the neighbourhood of this bridge consisted almost entirely of angular stones, which were used without any admixture of sand for making concrete, which was found to become most compact when the stones were perfectly clean; but the Birmingham gravel required a certain proportion of sand with it to make compact concrete.

In excavating for the foundations of the abutments several bones of deer and a human skull were found, at depths from 10 to 14 feet below the level of the bottom of the river.

The circumstances attaching to the partial failure of the small southern abutment arch were peculiar. It had been supposed to arise from the expansion of the iron-work taking place all in one direction, but after watching the arch for six months, he thought such an opinion was, to a great extent, unfounded; and he conceived it to have arisen partly from the abutment wall having slightly sunk at the back, owing to the great quantity of rain which fell at that period affecting the spongy soil upon which it was built.

For seven months the valley of the Avon, at the spot in question, was (with a very few days' intermission) under water immediately after the walls had been built, and before the bridge was nearly completed. An amount of sinkage which was scarcely perceptible in the back of the foundation of the wall, would have the effect of displacing the stones of the arch to the extent of some inches, and it was to this cause that he attributed the separation of the arch stones. As soon as the settlement appeared to have ceased, the defective stones were taken out and replaced, without interrupting the passage of the trains.

The north-eastern wing wall also failed from the same cause, viz., the spongy nature of the soil where it was thoroughly saturated with water; and if this had been foreseen, prevention would have been easy, by placing a firmer and more extended base of concrete under the footings of the wall.

He thought that the method of forming the piers was as good and as cheap as any known mode that could have been adopted; but if he had to build another bridge of the same dimensions, and under similar circumstances, he would not use cast-iron, but would construct it of timber, not on account of any engineering difficulty, but simply because a timber structure would be very much cheaper, and equally serviceable for the purposes of the railway, taking into account comparative durability as well as present cost.

ON THE LAWS RELATING TO LETTERS PATENT FOR INVENTIONS.

No. XIV.

THE PATENT LAWS OF PORTUGAL.

The law in force in Portugal for the protection of inventions is the same as that enacted for the purpose of securing to authors the copyright of books, prints, and other works of the mind. It appears that the Portuguese Government have considered these subjects to be so closely connected with each other, that they have thought it advisable to make the same laws affect both. In many instances, similar penalties are inflicted upon offenders for infringing upon the privileges granted under the authority of this law, whether the property protected consists of a new treatise or musical composition, or of a newly invented machine or chemical process. The law to promote so desirable an object as the protection of inventive genius, under whatever form it may appear, is but of very modern date, the decree having been signed so recently as January 1837. The following is a translation of the law, as published by the order of the Government in the "*Diario do Governo;*" and as many parts of the law refer to certain articles of the Penal Code, we have thought it desirable to extract such articles as are so referred to, and give a translation of them also, as a supplement to the law itself.

OFFICE OF THE SECRETARY OF STATE
FOR THE HOME DEPARTMENT.

Whereas, it being of the first importance to reward the authors of new inventions, and to establish regulations for that purpose, We hereby decree as follows :—

SECTION I.

Of the Property of New Inventions.

ART. 1.—The authors and inventors of new productions and new inventions, as referred to in Article 369 of the Penal Code, whether natives, or foreigners who may come to Portugal to make known their productions and inventions, shall possess over them an exclusive right of proprietorship, under the safeguard and protection of the law.

ART. 2.—The importers or introducers of new inventions mentioned in the article above referred to, will also acquire a right of proprietorship, as soon as the Government may grant them the respective patents.

ART. 3.—The privileges of those proprietors comprehended in Article 1, may extend, at the option of the said proprietors, over a space of fifteen years. The privileges of those persons contemplated in Article 2, will continue for such time as may be agreed upon, and conceded by the Government.

ART. 4.—These privileges are transmissible or transferable to the heirs and assignees of the proprietors, either by right of inheritance from relationship, by will, or by solemn contract or sale.

ART. 5.—After the patent has been granted to the proprietor, the State may enter into an agreement with the said proprietor, for the purchase of the property of an invention, which may be deemed of public utility.

ART. 6.—The law denies the right of action against infringements on the exclusive rights contemplated in the foregoing Articles, if, prior to the infringement, the privilege be not furnished with the titles of protection hereunder prescribed: the right of action is also denied in the cases mentioned in Section IV. of the present decree.

SECTION II.

Of Copyrights and Patents for new Inventions.—Proceedings relative to Diplomas, and the Fees and Taxes payable thereon.

ART. 7.—In the office of the Secretary for the Home Department a book will be kept for registering the Copyrights and

Patents which may be granted for new productions and new discoveries. Patents merely acknowledge, authenticate, or certify the declarations of the alleged inventor; but they do not guarantee the reality, the priority, or the merit of an alleged invention.

Art. 8.—The authors of new works or productions of the mind, intended for publication, who wish to enjoy the rights of proprietorship, must pay into the receiving place of the district in which they reside, the fee proportionate to the number of years they may determine on, according to the form specified in Art. 3: they must also deposit a copy of the work (which copy is not made public) in the office of the Administrator-General of the Province, and they will receive back a memorandum, containing a copy of the title or subject of the said work; and they will moreover obtain a certificate, testifying that no privilege has previously been granted for the said work. On production of these documents, the exclusive privilege or copyright will be furnished by the Secretary of State for the Home Department.

The memorandum above mentioned will be given in the space of ten days, and the privilege, or copyright document itself, in twenty days.

Art. 9.—The authors of new productions of genius, intended for publication, and the inventors of new discoveries, must fulfil the conditions above prescribed, by depositing copies, models, drawings, or engravings, and by depositing, signed and sealed, a correct description of the principles, means, and processes, which constitute the discovery, together with the plans, drawings, and models relating thereto. To these must be added, a description in duplicate, and signed by the owner, of the objects contained in the packet. On delivery, a memorandum will be given, acknowledging the receipt of the correct copy of the description, of the models and drawings reduced to a moderate scale;—all to be furnished by the applicants. On the production of this memorandum, and the documents above mentioned, the patent will be granted.

The memorandum and the patent will be delivered in the intervals above specified.

Art. 10.—For a new invention which has already been patented and made known in a foreign country, a patent will be granted for the time that the proprietor may wish to enjoy the privilege, that time not exceeding the interval fixed in Article 3, as above, the conditions specified in the last Article being fulfilled.

If the privileged person be a foreigner, he must moreover renounce his privileges at a given period.

Art. 11.—To the inventor of an improvement or a new discovery, a patent will be granted for his improvement, upon complying with the required conditions.

Art. 12.—The privileged person who may make an improvement or alteration in his invention, and wish to enjoy the proprietorship or exclusive right therein, can obtain a patent, upon complying with the required conditions: but, should he desire to enjoy the benefit of such improvement or alteration only during the remaining interval to which his original privilege extends, then the Government will grant merely a certificate, containing his declaration, and proving the delivery of the packet, as above described.

Art. 13.—The heirs and assignees of privileged persons are not obliged to apply for new patents: nevertheless, their right must be sanctioned by the authority of Government, and the requisite declarations must be entered in the register kept in the Office of the Secretary for the Home Department.

Art. 14.—Introducers who wish to enjoy the benefit of their right of proprietorship, must apply for their patents before the article is introduced. In case of concurrent applications for patents of this description, the Government will grant the patents to those individuals who may effect the introduction of the articles within the shortest space of time. The patent will be finally granted or withheld, as may be deemed fitting.

In the event of the patent being granted, it cannot extend beyond the period of five years.

Art. 15.—The Government tax will amount to 3⊕200 reals[*] for every year over which the privilege may extend. The copyrights and patents will be furnished gratuitously.

Art. 16.—Not more than one object can be protected under a single copyright, or patent.

Art. 17.—In no instance can the original period of privilege be extended, except at the solicitation of the proprietors.

Section III.

Of the Obligations of Patentees.

Art. 18.—Inventors and introducers possessing patent rights are required to exhibit to public observation their manufactures in complete detail and full work, at least twice every month, advertising such exhibition, three days beforehand, in the Government journal.

Art. 19.—If the invention consists of a chemical process, security must be given, to the amount of 1:000⊕000 reals; and at the expiration of the period of the privilege, the process must be performed three times in the presence of whomsoever may desire to witness it; its performance being preceded by the advertisements mentioned in the foregoing Article.

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[*] Equal to about 18*s.* sterling. Accounts in Portugal are kept in reals or rees, 1,000 of which = 1 milree. In the notation of accounts the milrees are separated from the rees by a crossed cypher, thus (⊕); and the milrees from the millions by a colon:—thus, Rs. 2.700⊕500 = 2700 milrees, and 500 rees. The gold milree is valued at about 5*s.* 8*d.* sterling.

Art. 20.—Transgression of the regulations provided in Article 18, will be punished as follows: for the first offence, by one half of the term of imprisonment and amount of fine to which the offence is liable; and if repeated a second time, the maximum of those penalties will be inflicted; but if repeated a third time, to the above punishments will be added, the confiscation of the articles.

Art. 21.—Transgression of the regulations provided in Article 19, will be punished by the maximum of imprisonment and fine allotted to the offenders, and the seizure of the chemical ingredients and instruments employed in the process; or by the forfeiture of the whole of the security in the event of the said articles having been carried away.

Section IV.

Of the ways in which the Privileges of the Proprietors of Patents may be cancelled or rescinded; and of the Regulations relative to Actions against them.

Art. 22.—The privileges belonging to copyrights and patents are cancelled and void, 1st, When one half of the interval allotted to the said privileges is suffered to elapse, without the proprietors having made use of them; 2ndly, By a judicial decision, declaring the said privileges to be useless or injurious; 3rdly, When the interval allotted for their exercise has expired.

Art. 23.—The law prescribes that actions shall be brought against any author, inventor, or introducer, who may allow one half the time of his privileges to expire, without exercising the invention.

An exception, however, is made in the special cases alluded to in Article 384 of the Penal Code, respecting which no course of proceeding is prescribed.

Section V.

Of Actions brought by and against Proprietors of Patents, and of the mode of proceeding therein.

Art. 24.—Proprietors of new inventions may institute criminal or civil actions, as mentioned in Articles 370 to 381 of the Penal Code, against those who infringe on their rights.

Art. 25.—Actions may be instituted against the proprietors of any privileges for the causes prescribed in Articles 382 to 385 of the Penal Code; and also in those relating to priority of publication.

Art. 26.—The question of priority must be regulated by the day on which any one of the competitors shall have fulfilled the forms and rules required by Articles 8 and 9.

Art. 27.—Publication is understood to take place, when the copy of any production, whether printed, lithographed, drawn, or engraved; patterns, plates, or models of machinery; or the recipes or descriptions of any of those things, shall, with the free will of the proprietor, pass into the possession of any person, not being a member of his family, or residing in the same house with him.

Art. 28.—The forms to be observed in actions brought against proprietors, are, in substance, the same as those to be observed by persons defending themselves in suits which proprietors may institute against them.

Art. 29.—Lawsuits maintained between proprietors and third persons shall be decided by a summary process, arbitrators being nominated by the parties, or by the judge, if the parties themselves do not nominate them: from the decision of these arbitrators appeal may be made to a higher authority. Or the litigants may refer the question to a judicial arbitration, against the decision of which there is no appeal.

Art. 30.—When the decision of a cause depends on the opening and examination of the packets deposited according to the form prescribed in Article 9, the persons making the examination must provide a security sufficient to compensate for the injury which may be sustained by the privileged proprietors through the disclosure of their secrets.

Art. 31.—In accordance with the rule laid down in Article 384 of the Penal Code, the same course will be observed as in other offences against the public safety, by the authorities who preside over, and whose duty it is to protect the same.

Section VI.

Of the Promulgation of new Inventions.

Art. 32.—When the duration of a privilege shall expire in any of the ways mentioned in Section 4, the Government will promote the publication of new inventions which may be of any great utility, in the Capital and the other cities of the kingdom, promulgating them as widely as possible, and causing the publication thereof to be renewed periodically.

Art. 33.—The exhibitions above mentioned must take place in the Capital every two years, the place and day of exhibition being previously announced.

Art. 34.—There will be established one or two prizes for the authors or inventors of those objects of public utility which are pronounced to be most perfect by competent judges, who will be selected by the Minister for the Home Department.

Art. 35.—The privileges and exclusive rights already granted to authors, inventors, and introducers, will remain in full force; with the same conditions and exemptions which were authorized before the issuing of the present Decree.

Art. 36.—All laws contrary to this Decree are from the present time revoked.

The Secretary of State for the Home Department will make known this Decree, and carry it into effect.

Signed by the Queen.

Given at the Palace de las Necessidades, on the sixteenth of January, one thousand eight hundred and thirty-seven.

Manuel da Silva Passos.

COPY OF ARTICLES FROM 368 TO 385, BOTH INCLUSIVE; EXTRACTED FROM THE PENAL CODE, CAP. II. SECTION II.

Art. 368.—An industrial fraud is that which is committed by means of the imitation or usurpation of new inventions.

Art. 369.—*New inventions* are those productions of knowledge or imagination not previously known,—manifested by writing, either prose or poetry, or by drawing, music, painting, or sculpture. To these may be added, all new discoveries in the construction, arrangement, and organization of instruments, engines, machines, apparatus, types, plates, moulds, models, and other articles of workmanship; or new chemical combinations and processes, or inventions for the improvement of any branch of the industrial arts, of agriculture, navigation, the art of war, naval or military, of the fine arts, and of science,—the said discoveries not being previously known within or without the kingdom. Among new inventions may likewise be classed the introduction and promulgation or publication of any of those discoveries which have already been known in any foreign country.

Modifications of forms, proportions, and ornaments are not, however, to be ranked among new inventions.

Art. 370.—Those persons are guilty of infringement, who, by means of printing, lithography, engraving, or sculpture, publish the writings, musical compositions, drawings, paintings, or any other productions of knowledge or imagination, to the prejudice of the authors, their heirs or assignees, within the period during which the exclusive right of property is authorized; whether the infringement be committed in the kingdom, or introduced into it.

Art. 371.—The theatrical representation of a dramatic piece, without the permission of its author, is regarded as an infringement on a copyright. In that case, the manager, or those who officiate for him, are held responsible.

Art. 372.—An infringement or unauthorized publication is committed, either when the whole of a book is copied, in the form in which the author wrote it, or when it is transferred or altered by abridgment, compilation, or any other alteration, the execution of which exhibits the same taste, the same scientific research, or the same learning.

Or, when the copyist mixes foreign matter with what is really his own work, and issues it all as original, even if the said work, after such compilation and combination, presents a new form and a new character.

Or finally, when any invention or pirated literary work, on being collated with its prototype, betrays a similarity in terms or expressions, analogy in principle, or uniformity in the order of execution.

Art. 373.—The transcription of disconnected passages, or the accidental coincidence of one or more ideas, are not accounted as infringements on copyrights.

Nor is it considered an infringement to adopt the mere title of a work. The work itself must be the subject of the action for damages, if there be any.

Art. 374.—Infringement is punishable by imprisonment, fine, and seizure* of the articles. The publishers, vendors, and distributors, are punishable by imprisonment or fine, like the other offenders.

Art. 375.—He who shall make or introduce any of the objects referred to in the second part of Article 369, whose mechanical construction may be identical with that of another new discovery or introduction, and shall put them forth as his own productions, during the patent-right or time of privilege granted to the real author or introducer, without his consent, is subject to the punishment named in the last article.

The vendors and distributors also will be punished according to the terms of the said article.

Art. 376.—The conditions of the last article are not applicable to the person who may invent or introduce an improvement on a privileged discovery, and who may make and put forth the improvement separately from the said discovery:—nor to the person who may invent or introduce or put forth an article whose mechanical construction is different from the privileged object, though it may effect the same results.

Art. 377.—The inventor or introducer of any patented article who may make, introduce, or promulgate improvements of the nature described in the last Article, either in connexion with or separately from his own article, without the consent of the inventor or introducer of the said improvement, will be subject to the penalty mentioned in Article 375.

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* The offenders are subject to a term of imprisonment varying from three to twelve days: the fine varies from 1⊕000 reals to 20⊕000 reals.

The vendors and distributors also will be punished according to the terms of the said article.

Art. 378.—Similarity of forms, proportions, and external ornaments, is not punishable, but may furnish ground for an action for indemnity, should any injury be sustained by it.

Art. 379.—Any person who may compose and put forth a chemical recipe, containing the same active ingredients which are employed in the recipe for any new privileged discovery, during the existence of the privilege; even though there should be added to the composition other ingredients of an inert and useless character, will be liable to the penalties referred to in Article 377.

Vendors and distributors will also be liable to the penalty set down in that Article.

Art. 380.—Nevertheless, no one is prohibited from producing, by any process which is not protected by patent, or by any other new method, those chemical preparations for which a patent may exist for the recipe.

Art. 381.—The terms of Article 370 have no reference to those drugs in relation to which a separate law is established.

Art. 382.—The privileged inventor, who may be guilty of any fraud with respect to the identity of the specimens and description, or recipes, which have been deposited with the competent authorities, for the future promulgation of the objects and recipes of which he will have the benefit during the period of his privilege, will incur the punishment awarded to the offence called *furto alheivoso.**

Art. 383.—The same penalty as that named in the last Article will be visited on any person who may add any new part to the object, after having deposited the model, or substitute any part for another of a different kind;—or on any person who may introduce into a recipe any new active drug, or substitute one drug for another of a different nature, without having previously made the declarations or observed the other forms required by the law.

Art. 384.—The privileged inventor, whose new invention may prove injurious to public safety, to agriculture, or to any branch of the public welfare, will be punished in the maximum of imprisonment, fine, and confiscation of the articles.

If it be proved that he has been guilty of no fraud or deception, then the punishment will be merely the said fine and confiscation.

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* Temporary public labour (Art. 365). The minimum duration of this punishment is three years, and the maximum twelve.

Art. 385.—All infraction of the laws and regulations made for the establishment and use of privileged inventions will be punished by the minimum term of imprisonment and fine, either conjointly or separately; or by the maximum term of imprisonment, and a fourth part of the fine, either conjointly or separately.

In either case, seizure or confiscation of goods may be added to the above-mentioned penalties.

Scientific Adjudication.

VICE-CHANCELLOR'S COURT.

Before Sir J. K. Bruce.—Feb. 1st, 1844.

POW *v.* BETTELEY.

This case was a motion for an injunction to restrain the alleged infringement of a patent obtained by John Robinson, February 28th, 1837, for the application of a nipping lever to a plain rimmed wheel or flange, for the purpose of communicating motion to the capstans and windlasses of ships, and of which patent the plaintiff was the assignee.

Mr. Rotch and Mr. Freeling were for the plaintiff, and Mr. Wigram and Mr. Follett for the defendant.

Mr. Rotch stated that the subject matter of the plaintiff's patent was the application of the lever grip for the purpose of turning the capstans or windlasses of ships. That the defendant, who also had taken out a patent bearing date August 11th, 1842,* applied a wrench to the same purpose.

For the defendant it was contended, that the wrench which he employed, and described in his specification, was a different invention to that described and claimed by the plaintiff, and that he did not employ the lever at all. Various models and drawings were exhibited on both sides, to prove the respective cases; on the one hand to demonstrate the infringement, and on the other to point out the dissimilarity of the two inventions.

His Honour said, that he considered he was, for the purposes of the motion, bound to hold the patent of the plaintiff valid; and offering an opinion as that of one unskilled in the knowledge of mechanics, yet feeling compelled to offer some opinion as a ground for his order, he must say, upon all the evidence before him, he thought there had been an infringement of the plaintiff's patent. Considering, however, that there had been more delay between the filing of the bill and the motion, than there could be between the motion and the trial, he thought he ought not at once to grant the injunction; and the more so, as it was not suggested that the defendant was not entirely responsible and solvent. The order he should make would be, that the motion stand over, and that the defendant undertake to keep an account in the ordinary way, and that the plaintiff be at liberty to bring such action within a week as he shall be advised, and let the London attornies of the defendant undertake to receive process instanter; the declaration to be delivered within a week, and the defendant to plead issuably within a fortnight from the delivery of the declaration; the venue to be either in London, Middlesex, or Liverpool, and no application to change the venue to be made till after the next Liverpool assizes. It was further ordered, that there should be an interim inspection of the works mutually, and each party to have liberty to apply.

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* For description of this invention, see p. 109 of our present Volume.

List of Patents

Granted by the French Government from the 1*st of July to the* 30*th of September,* 1841.

PATENTS FOR FIFTEEN YEARS.

(Continued from Page 147, Vol. XXIV.)

Perrève, of Paris, for improvements in the manufacture of iron.

Pigeard, of Paris, for improved steam boats.

Poole, of London, for improved locks and keys.

Rouen, of Paris, for a mechanical lamp.

Smith, of London, for improved smoke-consuming furnaces.

Stokes Sloper, of London, for a steam-engine on the condensing principle.

PATENTS FOR TEN YEARS.

Brewer, of London, represented by M. Perpigna, advocate, 2 ter, Rue Choiseul, for improved pulleys and wheels to be used in the navy.

Claudot, of Verdun, represented by M. Perpigna, for a new mode of carbonising wood.

Fouschard Brothers, represented by M. Perpigna, for a new mode of granulating syrups of potato.

Freminville & Co., of Lyons, represented by M. Perpigna, for improvements in instruments used for boring Artesian wells.

Yorke, of London, represented by M. Perpigna, for an improved breakwater.

Anchaux, of Paris, for an improved oven for manufacturing panes of glass.

Baillet, of Paris, for an improved machine for composing type.

Benoit, of Montpellier, for an improved mode of training silkworms.

Blaquière and Balp, of Lodève, for an improved motive power.

Charpiot, of Dijon, for a new fire engine.

Colin, of Paris, for a machine for marking the stitches in sadlers' work.

Couturier, of Lyons, for an inodorous seat for water-closets.

Crette, of Paris, for a machine for making artificial flower-buds on wires.

Elliott Le Blanc, of London, for improvements in railroads and locomotive engines.

Daliot and Chomeau, of Paris, for mechanism for indicating the level of the water in steam boilers.

Desfriches, of Lizieux, for machines for setting up the combs in looms.

Dupont and Jeanselme, of Paris, for an improved easy chair.

Farge, of Paris, for an improved umbrella.

Gaudin, of Granges, for mill stones in granite,

Grosrenaud, of St. Etienne, for an improved water wheel.

Hussenot, of Metz, for an improved mode of painting houses.

Hutin de la Touche, of Paris, for improvements in tanning.

Laborey, of Grey, for an improved turbine.

Légier, of Paris, for improvements in the manufacture of woollen cloth.

Legrand, of Paris, for an improved balsam for invigorating the hair.

Mahieu, of Paris, for a mechanical printing press.

Mathieu, of Paris; for an improved controller for registering the motions of any instrument actuated by percussion or by pressure.

Malo, of Paris, for improved clocks.

Malteau, of Elbeuf, for an improved fulling machine.

Passenger, of London, for an improved lamp.

Perrin, of Brussels, for an improved mode of manufacturing soap.

Perrin, of Brussels, for a mode of disinfecting fish oil.

Poitevin, of Paris, for a hook with a spring.

Poole, of London, for plates to be used in the Daguerrotype process.

Poole, of London, for the preparation of paper applicable to photography.

Raymond, of Paris, for an improved mode of grinding wheat into flour.

Salmon, of Caen, for a syphon actuated by steam.

Samuel Brothers, of Paris, for a rotatory engine to be worked by steam or compressed air.

Stears, of Saumur, for a mode of purifying hydrogen gas for illumination.

Theis & Co., of Brussels, for an improved shower bath.

Count de Villeneuve-Hayose, for a mode of manufacturing lime.

Wild, of Zurich, for streaked fire-arms.

Zacharie, of Lyons, for an improved coach spring.

Zammaretti, of Paris, for an improved calefyer.

PATENTS FOR FIVE YEARS.

Barault, of Chalons-sur-Saone, represented by M. Perpigna, for improvements in brewing.

Bellanger and Bonnegent, of Loué, represented by M. Perpigna, for an improved loom.

Blatter, of Lyons, represented by M. Perpigna, for a mode of manufacturing tubes in polished copper, used in the weaving of silk, &c.

Bonjean, of Avignon, represented by M. Perpigna, for a locomotive to be worked by compressed air.

Boucher, of Paris, represented by M. Perpigna, for an improved mode of protecting wire from oxidation.

Basse-Mouturie, of Lille, for an improved loom.

Bauby, of Paris, for an improved gas-burner.

Bergue, of Paris, for an improved mode of forging iron.

Bihan, of Paris, for an improved tap.

Blondel, of Paris, for improvements in pianos.

Bonzel, of Haubourdin, near Lille, for improvements in the heating of steam generators.

Bourgeois, of Nouvion, for an improved mill for grinding tan.

Bouys and Duvernoy, for improvements in lighting.

Bovy de Pregny, for an improved copying press.

Breton, of Midrié, for a diving coat.

Brie, of Paris, for a machine for cutting out gloves.

Brillats, of Mans, for a machine for pounding hemp.

Bruguière, of Nismes, for a distilling apparatus.

Cartau, of Paris, for an improved plush.
Cauvain, of Lille, for a machine for making sausages.
Charbonnier, of Paris, for an improved syringe.
Charrière, of Paris, for a scarifier on a new principle.
Charruy, of Paris, for an improved gas burner.
Choquet, of Paris, for improved opera glasses.
Contamine, of Paris, for improved fastenings for windows.
Dambreville and Faucher, of Paris, for an improved embrocation.
Daudville, of St. Quentin, for an improved fabric or tissue.
Deacon, of London, for an improved glass for lamps.
Delafosse, of Paris, for an improved mode of winding yarns.
Denar, of Lyons, for a stove for burning wood.
Devaux and Delbruk, of Paris, for improved clogs.
Domitiane, of Bazeilles, for improvements in carding machines.
Doussaint, Lean, and Moiet, for improvements in windmills.
Dubois, of Laval, for improvements in looms.
Dunand, of Paris, for improvements in lamps.
Dupont, of Bordeaux, for an improved pump.
Dupré, of Paris, for improvements in the casting of metals.
Durand de Menestrol, of Paris, for a chemical composition for fixing pencil drawings.
Druhain, of Paris, for an improved sharpener for whetting knives.
Ertz, of Paris, for improvements in lamps.
Fabbri, of Paris, for a process for curing dampness in walls.
Favre, of Paris, for a process for washing wool.
Foulquié, of Paris, for an improved machine for mincing meat.
Fourcroy, of Rouen, for improvements in steam engines.
Gauthier, of Corconne, for a machine for aerial navigation.
Godin, of Rouen, for the application of slate for making billiard tables.
Gombert, of Paris, for improvements in winding yarn.
Grun, of Gruebwiller, for an improved jenny mule.
Hely, of Paris, for a dog collar.
Herard and Hermann, of Rheims, for a machine for twisting the wires used in corking champaign.
Jacquin, of Mory, for improvements in clocks.
Jouin, of Paris, for improved pedestals for clocks, &c.
Jesson, of Paris, for an improved clock.
Keenan, of Caen, for a mode of manufacturing plat net.
Kriegielstein and Plantade, of Paris, for a means of tuning pianos, and making them keep in tune.

Laurent, of Paris, for an improved pump.

Le Goubé, of Rouen, for an improved sash frame.

Léonard, of Courcelles-Chaussy, for an improved straw-cutter.

Leutheusser, of Metz, for an improved mode of suspending carriages.

Madoulé, of Paris, for an improved night lamp.

Mairet, of Paris, for shoes without seams.

Masson, of Paris, for a mode of embossing leather.

Mayer, of Paris, for an improved cut for gloves.

Meignen, of L'Orient, for improved hinges.

Migeon, of Rheims, for an improved winding apparatus.

Milhau and Mercier, for certain improvements in typography.

Morris, of Lille, for improved bobbin net.

Newton, of London, for a mode of preparing wool and other animal fibre.

Oudinot-Lutel, of Paris, for the application of horsehair fabric to the making of wearing apparel.

Oudinot-Lutel, of Paris, for the horsehair fabric called *Corsetnoline.*

Pape, of Paris, for an improved mode of lighting workshops.

Petry, of Lons-le-Saulnier, for an improved stove.

Petry and Raillard, of Chatillon, for a reaping apparatus.

Pichon, of Poitiers, for an imitation of engraving in relievo.

Picot, of Chalons, for improvements in the mode used for extracting oils.

Poole, of London, for a machine for combing wool.

Rankins, of Paris, for wood pavement.

Renault, of Paris, for a machine for grooving wood.

Rivet, of Paris, for improvements in hats.

Rouquet and Gaumet, of Bedarieux, for an improved comb for carding engines.

Thévenon, of Clermont, for improved fastenings for doors.

Touzan, of Paris, for an improved crane.

Travanet, of Paris, for a machine for extracting earth,

Tripot, of Paris, for improvements in the manufacture of paper.

Wernemunde, of Paris, for improved blinds for windows.

Westmacot, of Paris, for artificial marble.

Vila, of Paris, for a new opera-glass.

Villacrose, of Paris, for a mode of manufacturing animal soap.

Zaoué, of Marseilles, for a mode of establishing a communication from one point to another by means of fire-arms.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

Feb. 27. *Joseph Carter*, of Gentleman's Walk, Norwich, for a design for a glove.

28. *Robert Corden* and *Sidney Smith*, of Nottingham, for a design for a domestic gas generator.

29. *Samuel Newman Rodier*, of Exeter, for Rodier's water-repelling ventilator.

29. *Welch & Margetson*, of 134, Cheapside, London, for an improved collar.

Mar. 1. *Joseph Beaumont*, of Commercial-road East, for a sugar vacuum-pan feed regulator.

1. *William Mayhew*, of Union-street, Southwark, for Mayhew's design for an improved ventilating hat.

1. *John Major Duncombe*, of Buckingham, for an improved button.

2. *John Frearson*, of Birmingham, for "the radial button."

5. *Waddington, Horton, & Co.*, of London Wall, in the city of London, for an improved parasol.

7. *Charles Bond*, of 62, Cannon-street, City, for an improved winch-handle for fishing-reels.

8. *Charles Fox Smith*, of 281, Strand, London, and Hatcham, Surrey, for "the Victoria lamp for burning camphine, alcohol, and other combustible fluids."

9. *W. H. Childs*, of Providence-row, Finsbury-square, for Childs' improved brush.

9. *Joseph & Thomas Todd*, of 3, Melbourne-place, George the Fourth's Bridge, Edinburgh, for a metallic eyelet fastener.

9. *George Grainger*, of Worcester, for a design for a drawing-room flower-pot, in porcelain or earthenware.

12. *Aaron Atherton & Co.*, of Wolverhampton, for an iron for ironing.

15. *Thomas Leftwich*, of Cumberland Market, for an improved carriage-wheel.

16. *Topham & Fawcett*, of Derby, for a glove.

16. *Edmund Gimson*, of Garratt-lane, Wandsworth, for Gimson's improved washing or cleansing apparatus.

Mar. 18. *William Hancock, Jun.*, of Amwell-street, in the county of Middlesex, for "the triunite military and domestic shoe brush."

19. *H. A. Holden*, of 96, Suffolk-street, Birmingham, for a design for a lamp for the roofs of railway and other carriages.

20. *Holden, Lowe, & Lowe*, of Birmingham, for a design for an improved carriage-step.

20. *Cope & Collinson*, of 40, Fleet-street, Birmingham, for an improved screw for music-stools.

22. *John Warner & Sons*, of 8, Crescent, Jewin-street, City, for a design for combining two cocks with one handle to supply boilers and ranges with water, and to draw off water therefrom.

23. *M. Merryweather*, of 63, Long Acre, London, for a cabinet fire-engine.

List of Disclaimers
OF PARTS OF INVENTIONS AND
Amendments
MADE UNDER LORD BROUGHAM'S ACT.

Samuel Stocker,—disclaimer and memorandum of alteration, dated 4th March, 1837, for "improvements on pumps." Filed 5th March, 1844.

List of Patents

That have passed the Great Seal of IRELAND, from the 16th February, to the 16th of March, 1844, inclusive.

To Alfred Vincent Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, mechanical draftsman, for improvements in the manufacture of cyanogen and its compounds, particularly the prussiates of potash and soda,—being a communication.—Sealed 27th February.

Margaret Henrietta Marshall, of Manchester, in the county of Lancaster, for a certain improved plastic composition, applicable to the fine arts, and to useful and ornamental purposes. —Sealed 8th March.

Hamilton Wood, of No. 5, Henrietta-street, Covent-garden, Westminster, in the county of Middlesex, Gent., for an improvement in producing uneven surfaces on wood.—Sealed 8th March.

William Wilson, Jno. Studholme Brownrigg, John Cockerell, and Sir Geo. Gerard De Hochepied Larpent, Bart., all of Belmont, in the Wandsworth-road, parish of Lambeth, county of Surrey, patent cocoa-nut candle and oil manufacturers, and cocoa-nut oil merchants, for an extension of an invention for three years, from the 9th September, 1844, of a new preparation or manufacture of a certain material produced from a vegetable substance, and the application thereof to the purposes of affording light, and other uses.—Sealed 14th March.

John Kibble, of Glasgow, Gent., for improvements in apparatus for propelling vessels, and in transmitting power in working machinery when endless belts, chains, or straps are or may be used.—Sealed 14th March.

List of Patents

Granted for SCOTLAND, subsequent to February 22nd, 1844.

To William Rowan, of the firm of John Rowan and Sons, of Doah Foundry, Antrim county, engineer, for certain improvements in axles.—Sealed 26th February.

Gottlieb Boccius, of the New-road, Shepherd's-bush, London, for certain improved arrangements and apparatus for the production and diffusion of light.—Sealed 5th March.

Thomas Murray Gladstone, of the Swan Garden Iron Works, Wolverhampton, Staffordshire, iron master, for certain improvements in machinery for cutting or shearing iron, or other metals.—Sealed 5th March.

George Bennetts, of Gunes Lake, in the county of Cornwall, civil engineer, for certain improvements in steam-engines and boilers, and in generating steam.—Sealed 8th March.

Edward Eyre, of Poole's Hotel, London, for certain improvements in railways, and in the machinery or apparatus to be employed therein,—being a foreign communication.—Sealed 11th March.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, London, civil engineer, for improvements in the preparation of caoutchouc or India-rubber, and in manufacturing various fabrics of which caoutchouc forms a component part,—being a foreign communication.—Sealed 12th March.

Joseph Crawhall, of Newcastle-upon-Tyne, rope maker, for improvements in machinery for manufacturing ropes and cordage. —Sealed 20th March.

Richard Prosser, of Birmingham, civil engineer, and Job Cutler, of Lady Pool Lane, near Birmingham, for improvements in the machinery to be used in the manufacturing pipes and bars, and in the application of such pipes and bars to various purposes. —Sealed 21st March.

Isabella Larbalestier, of Noble-street, Falcon-square, London, furrier, for improvements in making certain skins resemble the sable fur.—Sealed 22nd March.

Henry Brown, of Selkirk, manufacturer, for improvements in carding silk, cotton, and other fabrics.—Sealed 22nd March.

Moses Poole, of Lincoln's-inn, for improvements in steam-engines, steam-boilers, and furnaces or fire-places,—being a foreign communication.—Sealed 22nd March.

New Patents

SEALED IN ENGLAND.

1844.

To William Glegg Gover, of Chester-square, Middlesex, Gent., for a method of casting off the sash lines and weights from the window sashes, and of taking out the window sashes from their frames, without removing the beads. Sealed 1st March —2 months for inrolment.

Joseph Crawhall, of Newcastle-upon-Tyne, rope-manufacturer, for improvements in machinery for manufacturing ropes and cordage. Sealed 2nd March—6 months for inrolment.

John Stevelly, of Belfast, Professor of Natural Philosophy, for improvements in steam-engines. Sealed 2nd March—6 months for inrolment.

Henry Dunington, of Nottingham, manufacturer, for improvements in the manufacture of fabrics produced in warp and lace machinery. Sealed 4th March—6 months for inrolment.

Peter Ward, of West Bromwich, Stafford, practical chemist, for an improvement in combining matters for washing and cleansing. Sealed 4th March—6 months for inrolment.

Samuel Atkinson, of Manchester-street, Gray's-inn-road, Middlesex, turner, for improvements in the construction of wheels for carriages. Sealed 4th March—6 months for inrolment.

Bernard Peard Walker, of North-street, Wolverhampton, clerk, for improvements in machinery for making nails. Sealed 6th March—6 months for inrolment.

Thomas Forster, of Streatham, Surrey, manufacturer, for improvements in preparing compositions of India-rubber and other articles, for forming articles therefrom, and for the coating of surfaces of leather, and woven and other fabrics. Sealed 6th March—6 months for inrolment.

William Henry Barlow, of Leicester, civil engineer, for improvements in the construction of keys, wedges, or fastenings for engineering purposes. Sealed 6th March—6 months for inrolment.

William Fairbairn, of Manchester, engineer, for certain improvements in machinery used for propelling vessels by steam power. Sealed 7th March—6 months for inrolment.

Charles Townend, of Manchester, fustian manufacturer, for an improved process or manufacture whereby cotton fabrics are aided, and made repellent to water and mildew, and any unpleasant smell is prevented in such fabrics. Sealed 7th March —2 months for inrolment.

Alexander Angus Croll, of Brick-lane, Middlesex, superintendant of the gas works, and William Richards, of the same place, mechanical inspector, for improvements in the manufacture of gas for the purpose of illumination, and in apparatus used when transmitting and measuring gas. Sealed 7th March—6 months for inrolment.

Wilton George Turner, of Gateshead, Durham, Doctor in Philosophy, for the manufacturing of salts of ammonia, and compounds of cyanogen, from a substance never before applied to that purpose. Sealed 11th March—6 months for inrolment.

Charles Harrison, manager of the Coed Talon and Leeswood iron-works, Flintshire, for certain improvements in the manufacture of cast-iron pipes, and other iron castings. Sealed 14th March—6 months for inrolment.

Charles Roberts, of High Holborn, Middlesex, boot-maker, for improvements in the manufacture of boot and shoe trees, lasts, and stretchers. Sealed 14th March—6 months for inrolment.

William Godfrey Kneller, of Wimbledon, Surrey, chemist, for improvements in the preparation of zinc, and in combinations of zinc with other metallic bodies. Sealed 14th March—6 months for inrolment.

Henry Pershouse Parkes, of Dudley, Worcester, manufacturer of chain cables, for improvements in the manufacture of flat pit-chains. Sealed 14th March—6 months for inrolment.

Samuel Cunliff Lister, and James Ambler, of Bradford, Yorkshire, manufacturers, for improvements in machinery for applying fringes to shawls and other articles. Sealed 14th March—6 months for inrolment.

Frederick Stephenson, of High-street, Birmingham, comb manufacturer, for improvements in book-binding, and apparatus for cutting books, or other folded paper, part of which improvements is applicable to pen-holders. Sealed 14th March—6 months for inrolment.

John Browne, of New Bond-street, Middlesex, Esq., for improvements in urinary utensils. Sealed 14th March—6 months for inrolment.

William Bown, of Leicester, glove and mit manufacturer, for improvements in weaving elastic fabrics. Sealed 14th March —6 months for inrolment.

John Tatham, of Rochdale, machine-maker, and David Cheetham, of the same place, cotton-spinner, for certain improvements in machinery or apparatus to be employed in the preparation and spinning of cotton, wool, and other fibrous substances. Sealed 14th March—6 months for inrolment.

Moses Poole, of Lincoln's-inn, Middlesex, Gent., for improvements in steam-engines, steam-boilers, and furnaces or fire-places,—being a communication. Sealed 14th March—6 months for inrolment.

Emanuel Wharton, of Birmingham, engineer, for certain improvements in steam-engines, which are in whole, or in part, applicable to other motive engines, and to machines for raising or impelling fluids. Sealed 14th March—6 months for inrolment.

Thomas Seymour, of Riding-house-lane, Great Portland-street, Middlesex, gun-maker, and John Seymour, of Wellington-place, Gray's-inn-lane, lock-filer, for an improved safety bolt and tumbler for the locks of certain kinds of fire-arms. Sealed 14th March—6 months for inrolment.

William Henry Burke, of Tottenham, Middlesex, manufacturer, for certain improved machinery for cutting India-rubber, and other elastic substances, into balls and other solid figures. Sealed 19th March—6 months for inrolment.

William Saunders, of Bush-lane, London, chemist, for an improved apparatus for modifying temperature in the condensation of vapours, and in the cooling or heating of liquids and fluids. Sealed 19th March—6 months for inrolment.

Hugh Inglis, of Kilmarnock, Scotland, mechanic, for improvements upon locomotive steam-engines, whereby a saving of fuel will be effected, which improvements are applicable to steam-vessels and other purposes; and to the increasing the adhesion of the wheels of railway-engines, carriages, and tenders upon the lines of rail, when the same are in a moist state. Sealed 19th March—6 months for inrolment.

William Bates, of Leicester, fuller and dresser, for improvements in the dressing and getting up of hosiery goods, manufactured from lamb's-wool, and other yarns, and in machinery for raising the nap on the same; and in the construction of legs and other forms or shapes for stockings, and other articles of hosiery. Sealed 19th March—6 months for inrolment.

Jules Thiebeauld de la Crouée, of Pinner's-court, London, merchant, for an improved apparatus for, or method of, purifying, clarifying, and refining vegetable extracts,—being a communication. Sealed 19th March—6 months for inrolment.

André Drouet de Charlieu, of Sablonière Hotel, Leicester-square, Gent., for improvements in rails for railways, and in wheels for locomotive carriages,—being a communication. Sealed 20th March—6 months for inrolment.

William Isaac Cookson, of Newcastle-upon-Tyne, Esq., for improvements in apparatus for burning sulphur in the manufacture of sulphuric acid. Sealed 20th March—6 months for inrolment.

John Holland Butterworth, of Rochdale, Lancaster, cotton-spinner, for a certain apparatus applicable to preparation machines used in the spinning of cotton, and other fibrous materials. Sealed 20th March—6 months for inrolment.

Moses Poole, of Lincoln's-inn, Middlesex, Gent., for improvements in dyeing,—being a communication. Sealed 21st March—6 months for inrolment.

John Butt, of Maldon, Essex, draper, for certain improvements in candlesticks. Sealed 22nd March—6 months for inrolment.

John Harcourt Quincey, of Old-street, City-road, Gent., and John Johnston, of Cursitor-street, lamp-maker, for improvements in the manufacture of lamps, and shades for lamps, and other lights,—being partly a communication. Sealed 25th March—6 months for inrolment.

William Pollard, of Newcastle-upon-Tyne, Gent., for certain improvements in the manufacture of ammonia and its compounds. Sealed 28th March—6 months for inrolment.

James Hardy, of Birmingham, Gent., for certain improvements in the process of welding tubes, pipes, or hollow rods of malleable iron by machinery. Sealed 28th March—6 months for inrolment.

Alfred Richard Johnson, of Regent-street, Bond-street, hatter, for certain improvements in hats. Sealed 28th March—6 months for inrolment.

Joseph Maudslay, of Lambeth, engineer, for certain improvements in steam engines. Sealed 28th March—6 months for inrolment.

Joseph Cooper, of Hoxton, Middlesex, Gent., for certain improvements in the purification and clarification of sugar, which improvements are also applicable to the purifying and clarifying of other articles of commerce. Sealed 28th March—6 months for inrolment.

Robert Davison, of Brick-lane, civil engineer, and William Symington, of East Smithfield, civil engineer, for a method or methods of drying, seasoning, and hardening wood and other articles, parts of which are applicable to the desiccation of vegetable substances generally. Sealed 28th March—6 months for inrolment.

Robert Mollett, of Shacklewell, Middlesex, Gent., and Jesse Bridgman, of Hackney, Gent., for certain improvements in separating the fatty and oily from the membranous portions of animal and vegetable substances. Sealed 28th March—6 months for inrolment.

Charles William Spicer, of Portman-square, Middlesex, Esq., for an invention called the Nautilus or portable life preserver, and swimming belt,—being a communication. Sealed 28th March—6 months for inrolment.

CELESTIAL PHENOMENA FOR APRIL, 1844.

D.	H.	M.	
1			Clock before the sun, 3m. 53s.
	—		☽ rises 4h. 41m. A.
	—		☽ passes mer. 10h. 47m. A.
	—		☽ sets 4h. 13m. M.
	—		Occul. *e* Leonis, im. 6h. 41m. em. 7h. 35m.
	2		Occul *q* Virginis, im. 10h. 55m. em. 11h. 58m.
3	6	58	Ecliptic oppo. or ○ full moon
	23		☽ in Perigee
5			Clock before the sun, 2m. 41s.
	—		☽ rises 10h. 20m. A.
	—		☽ passes mer. 1h. 34m. M.
	—		☽ sets 6h. 3m. M.
7	2	0	♀ in Perihelion
	14	45	☿ in sup. conj. with the ☉
8			Occul. 31 Sagittarii, im. 15h. 18m. em. 16h. 13m.
9	10	9	☽ in □ or last quarter
10			Clock before the sun, 1m. 15s.
	—		☽ rises 2h. 4m. M.
	—		☽ passes mer. 6h. 30m. M.
	—		☽ sets 11h. 4m. M.
	17	17	♄ in conj. with the ☽ diff. of dec. 4. 32. S.
12	12	30	☿ in the ascending node
14	8	34	♃ in conj. with the ☽ diff. of dec. 6. 37. S.
14			Mercury R. A. 1h. 58m. dec. 12. 20. N.
	—		Venus R. A. 4h. 21m. dec. 23. 54. N.
	—		Mars R. A. 3h. 44m. dec. 20. 30. N.
	—		Vesta R. A. 19h. 59m. dec. 18. 50. S.
	—		Juno R. A. 2h. 16m. dec. 6. 43. N.
	—		Pallas R. A. 16h. 18m. dec. 19. 59 N.
	—		Ceres R. A. 16h. 22m. dec. 14. 4. S.
	—		Jupiter R. A. 23h. 27m. dec. 4. 36. S.
	—		Saturn R. A. 20h. 35m. dec. 19. 1. S.
	—		Georg. R. A. 0h. 14m. dec. 0. 45. N.
	—		Mercury passes mer. 0h. 27m.
	—		Venus passes mer. 2h. 50m.
	—		Mars passes mer. 2h. 31m.
	—		Jupiter passes mer. 21h. 53m.
	—		Saturn passes mer. 19h. 1m.
	—		Georg. passes mer. 22h. 39m.
15			Clock after the sun, 0m. 3s.
	—		☽ rises 3h. 53m. M.
	—		☽ passes mer. 10h. 19m. M.
	—		☽ sets 4h. 59m. A.
	9	8	♅ in conj. with the ☽ diff. of dec. 5. 58. S.
17	1	58	☿ in Perihelion
	4	32	Ecliptic conj. or ● new moon
	6	59	☿ in conj. with Juno, diff. of dec. 7. 57. N.
18	7	49	☿ in conj. with the ☽ diff. of dec. 1. 52. S.
19	6		☽ in Apogee
	12	55	Vesta in □ with the ☉
20			Occul Mars, im. 3h. 59m. em. 5. 14m.
20			Clock after the sun, 1m. 11s.
	—		☽ rises 5h. 54m. M.
	—		☽ passes mer. 2h. 4m. A.
	—		☽ sets 10h. 20m. A.
	16	2	♃'s first sat. will im.
	3	52	♂ in conj. with the ☽ diff. of dec. 0. 20. S.
21	5	4	♀ in conj. with the ☽ diff. of dec. 2. 45. N.
			Occul. 29 Cancri, im. 11h. 29m. em. 11h. 59m.
25			Clock after the sun, 2m. 10s.
	—		☽ rises 10h. 30m. M.
	—		☽ passes mer. 6h. 8m. A.
	—		☽ sets 1h. 7m. M.
	8	17	☽ in □ or first quarter
26	16	15	♄ in □ with the ☉
27			Occul *q* Virginis, im. 7h. 29m. em. 8h. 5m.
27	10	7	☿ greatest Hel. Lat. N.
29	7	51	♀ greatest Hel. Lat. N.

J. LEWTHWAITE, Rotherhithe.

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CONJOINED SERIES.

No. CXLIX.

RECENT PATENTS.

To John Duncan, *of Great George-street, in the city of Westminster, Gent., for an invention of improvements in machinery for excavating soil,—being a communication.*—[Sealed 7th March, 1842.]

This invention is divided into two parts, consisting, Firstly,—in a novel construction of machinery for excavating and removing earthy matters, for the formation of railways, canals, docks, harbours, and other similar works, which require the removal of large quantities of earth; and Secondly,—in certain variations in, and additions to, the machinery, for the purpose of rendering it applicable for dredging or deepening rivers, harbours, and other under-water operations.

Fig. 1, Plate X., represents in geometrical elevation one side of the excavator or machine, to be used on land; Fig. 2, represents the opposite side of the machine, (in this last-mentioned figure some of the parts are shewn in different positions to those of the preceding figure); and fig. 3, is a plan view of the machine, some of the upper parts being removed, and their positions shewn by dotted lines, to avoid confusion.

The machine is principally composed of the following parts:—First, a strong horizontal framing *a*, mounted upon wheels *b*, by means of which the machine may be moved along a temporary railway, (previously laid down for that purpose,) as it excavates and removes the earth before it. Secondly, a strong crane *c*, *d*, *e*, placed at one end of the framing, and which may be turned round on a centre, either to the right or left, and beyond a right angle, for purposes hereafter explained. Thirdly, a scraper, scoop, shovel, excavator, or digging tool *f*, *g*, *h*, for loosening and collecting the earth; this instrument is suspended by chains or ropes, at the outer end of the crane. Fourthly, a steam-engine, or other prime mover, placed at the hind end of the frame *a*, to give motion to the different parts of the machine. And Fifthly, an arrangement of wheel-work, for communicating the power of the engine to the various moving parts.

The frame-work or base of the machine is rectangular, and supported upon running-wheels *b*. At one end of the framing the crane-post *c*, rises perpendicularly; and at the upper end of this post is mounted the crane-jib *d*; the outer end of which is supported and strengthened by diagonal arms *e*, *e*. The scraper or shovel is made of stout boiler-iron, having four or more projecting steel points *g*, in front, for loosening the earth; and at the base or root of these points a finely tempered steel edge is fixed. The scraper or shovel is suspended from the crane-jib *d*, by chain-tackle *j*, *j*, which passes up over a pulley *k*, at the front end of the jib, and over another pulley *l*, at the opposite end; from thence it descends through the crane-post *c*, and under the pulley *m*, to the main drum or windlass *n*, around which it is wound when the shovel or scraper is being raised. Rotary motion is communicated to the main drum *n*, through the intervention of wheel-work, gearing into the large spur-wheel *o*, on the axle of the main drum; this wheel-work is actuated by a steam-engine, which, in order to prevent confusion, is not shewn in the drawings, but should be situate on the framing *a*, between the main drum and the boiler. On the shaft of the main drum is mounted a friction-pulley 1, furnished with a friction-band or brake 2, (see fig. 3,) connected to the tumbling-shaft 3. The shaft of the main drum *n*, is made hollow, nearly throughout its whole length, and is furnished with a ratchet-wheel 4, provided with palls or clicks 5, for the purpose of preventing the main drum from unwinding when the scraper has attained its proper altitude.

There is also on the main drum-shaft, and close against the ratchet-wheel 4, a coupling-clutch 6, which slides on the main shaft, and is connected with the ratchet-wheel 4, by two pins, firmly fixed to the ratchet-wheel, and passing through holes in the clutch; the ratchet-wheel has two slots in it, and through the slots two stout catches, attached to the clutch, project. The large spur-wheel *o*, on the drum-shaft, revolves loosely upon it, when the scraper is not being raised; on the inner side of this wheel *o*, is fastened a ratchet-wheel; the teeth of which are formed on its face, so that by sliding the clutch 6, close to the ratchet-wheel 4, the catches of the clutch slide through the slots in the ratchet-wheel 4, until they gear into the teeth on the face of the ratchet on the spur-wheel *o*, whereby the driving-power of the steam-engine is communicated to the main drum.

The clutch 6, is affixed to a sliding-rod, which passes through the hollow shaft of the main drum, and is connected, at its right-hand end, by a swivel-joint 7, (see plan view, fig. 3, and side view, fig. 1,) to an arm or lever, on the upright tumbling-shaft 8. Lower down on this shaft another arm is placed, to which is connected a rod 9, leading backwards to a hand-lever 10, at the hinder part of the machine, and is used for throwing the clutch 6, into gear with the ratchet on the spur-wheel *o*, and thereby causing the drum to rotate.

After the scraper or shovel has deposited its load, it must be brought down again for a second operation; and to effect this, the palls or catches 5, must be raised from the teeth of the ratchet-wheel 4, in order to allow the main drum *n*, to turn back and uncoil the chain *j*, *j*. This is effected by means of the horizontal tumbling-shaft 8; at one end of which is fixed the lever-arm or rod 11, furnished with pins for raising the clicks 5, and at the other end an arm 12, projects downwards, as seen in fig. 1, and is connected to one end of a long rod 13, which leads to a foot-lever 14, at the back part of the machine. The rod 13, may also be worked by the short rod 15, connected to it at one end, and having, at its other end, a pinion 16, that turns on a stud on the inside of the framing. On the inside of this pinion are placed two pins, that operate as cranks, and a catch is made on the back end of the rod 15, which takes hold of one of the pins on the pinion 16. Motion is given to the pinion bў means of a toothed segment 17, which is fastened on to the axle of the hand-lever 10; so that when this lever is moved forward, to throw the main drum *n*, into gear, the segment 17, turns the pinion 16, partly round, thereby moving the rod 13, and the tumbling-shaft 3, and raising the palls or catches 5, by means of the small lever-arm 11, at the opposite end of the tumbling-shaft 3. At the same time the band or brake 2, is caused, by the revolution of the tumbling-shaft, to bind more firmly on the friction-pulley 1, and thereby prevent the chain on the main drum from uncoiling too rapidly, and letting the scraper suddenly fall.

The movements of the scraper or shovel *f*, are produced and regulated by the wheel-work or mechanism attached to, or mounted on, the diagonal arms *e*, *e*; and this mechanism is actuated in the following manner:—The periphery of the pulley *l*, at the top of the crane-post, is indented, or has interstices formed in its groove; which interstices correspond with the links of the chain *j*, *j*, so that as the chain is moved one way or the other, the pulley *l*, is made to revolve. On the same shaft as the pulley *l*, a bevil pinion *p*, is mounted, gearing into another pinion *q*, on the upper end of the diagonal shaft *r*; at the lower end of which shaft is a similar bevil pinion *s*, gearing into a corresponding one, mounted loosely on the end of the shaft *t*. On the back of this pinion a flange *u*, about one inch thick, is cast, with a groove in its periphery, which receives a friction-brake *v*, that may be tightened or loosened at pleasure. The bevil pinion and its pulley *u*, may therefore revolve without causing the shaft *t*, to rotate. Immediately behind the pulley *u*, a revolving arm *w*, is fixed to the shaft *t*, and one end of the friction-break or band *v*, is connected to one end of this arm *w*, by a small crank-lever. The shaft *t*, is hollow, with a slot throughout the greater part of its length, containing a sliding-rod *x*;

the inner end of this sliding-rod is attached to a small rack, which slides freely on the shaft *t*, and gears into a small pinion, mounted in bearings on the revolving arm *w*, before mentioned.

A lever *y*, is attached to the left-hand end of the sliding-rod *x*; this lever vibrates on a centre, and is connected, at its opposite end, to a hand-lever *z*, by which the mechanism is worked. Near the left-hand end of the hollow shaft *t*, and firmly affixed thereto, is the friction-pulley 18, which is provided with a band, similar to *v*, on the pulley *u*, above mentioned. The friction-band of the pulley 18, is connected to one end of the horizontal shaft 19; and the other end of this shaft is furnished with a hand-lever 20, by means of which the friction-band is tightened on the pulley 18. On the extreme end of the shaft *t*, is mounted the pinion 21, which gears into a spur-wheel 22, on the shaft of the drum 23; the periphery of this drum is formed with a right and left-handed helical groove, for the purpose of receiving the chains 24, which pass once round it, and are connected, at both ends, to the moveable arms 25, that carry, at their forked end, the shovel or scraper *f*. The moveable arms of the scraper roll backwards or forwards on the drum, according to the motion that is communicated to the drum and chain, by means of the mechanism that actuates the large spur-wheel 22, and which is regulated by the attendant, by means of the hand-levers *z*, and 20. The attendant, that works these levers, stands on a platform 26, in front of the crane-post; and as the scraper is raised by the chain, this latter actuates the pulley *l*, and through it motion is communicated to the pinions *p*, *q*, *s*, and the pinion on the end of the shaft *t*; therefore, when the attendant, by means of the hand-lever *z*, causes the friction-band *v*, to bear tightly on the pulley *u*, in the manner above described, the points *g*, of the scraper are forced or pressed forward into the bank, by means of the mechanism on the diagonal arms *e*, *e*.

If it is required to hold the scraper or shovel out in any particular position, the friction-band on the pulley 18, is drawn tight, by means of the hand-lever 20, and then the band *v*, on the pulley *u*, may be relaxed. If, on the other hand, it should be necessary to allow the scraper to run back suddenly from the bank, in order to avoid a falling stone, or large mass of earth, all that is required is to suddenly relax both friction-bands on the pulleys *u*, and 18, and the scraper will immediately fly back by its own gravity.

Now, suppose that the scraper or shovel having entered the bank at the lowest point, has been raised to the highest, and has thereby become filled with earth, which is to be emptied into a car or waggon, or otherwise deposited by the side of the machine,—in order to do this, the shovel or scraper must be moved round horizontally, until it arrives in a position immediately above the place of deposit. This is effected by the following arrangement of parts:—The crane-post *c*, is firmly fixed to the solid frame-work *a*, and forms the centre of motion, round which the parts, hereafter mentioned, move. At the top of the crane-post is mounted the large pulley 27, which, from its shape, as shewn by dots in fig. 3, is called "the horse-shoe pulley." It is supported mainly by the crane-jib, to which it is fastened by strong iron and other bearings, as at 28. The lower end of the diagonal arms *e*, *e*, abut against a loose collar 29, at the base of the crane-post, around which the loose collar turns. From this description it will be seen, that the crane-jib *d*, the horse-shoe pulley 27, and the diagonal arms *e*, *e*, are all braced firmly together, and therefore must all turn together. The horse-shoe pulley is furnished with a chain 30, both ends of which are fastened to the wooden bracings 28, which connect the said pulley to the crane-jib *d*. This chain 30, passes over the ends of the horse-shoe pulley, and round the periphery thereof (which is grooved for that purpose) to the back of the said pulley; then it passes between two horizontal pulleys 31, 31, and over one of the two vertical pulleys 32, 32; from thence it proceeds downwards, and once round a pulley 33, mounted loosely on the axle of the pinion 34, as seen in plan view; it then rises up again over the other vertical pulley 32, between the horizontal pulleys 31, round the other side of the horse-shoe pulley 27, to the other wooden bracing 28. The pulley 33, is formed with indentations or recesses, in the same manner as the pulley *l*, on the top of the crane-post. Connected with the shaft of the pulley 33, is an arrangement of shafts and bevil-wheels, with coupling-boxes, which will admit of this pulley being turned in either direction, in order to swing round the horse-shoe pulley and crane, either to the right or left, as may be required. 35, is a friction-pulley, fixed on the same shaft as the pinion 34, and furnished with a friction-band or brake, both ends of which are fastened to the framing of the machine, by means of screw-nuts. On the side of this pulley 35, are two projecting pieces, with holes bored therein; and close to it is another friction-pulley 36; round which, in a half-round groove, is fitted a friction-band, the ends of which pass through the holes in the projecting pieces on the side of the pulley 35, and are fitted with screw-nuts, to tighten the band on the pulley 36, which is also furnished with a clutch, to connect it with the chain-pulley 33. These friction-bands and pulleys are employed to prevent the smaller parts of the mechanism from being broken or strained when the whole power of the engine is brought suddenly to act upon them, in order to move round the great weight of the crane and scraper with its load. Before the power of the engine begins to act upon this heavy weight, it has to overcome the friction of the band on the pulley 36; this band being tightened by the screw-nuts just sufficiently to allow it to slip round, until the inertia is so far overcome as to cause the band to turn the pulley steadily, and therefore the power is brought gradually to bear upon the chain-pulley 33. The friction-pulley and brake 35, are employed to stop the momentum of the crane, after the turning power is thrown out of gear.

The turning-round motion above described, and also the motion for moving the machine along the temporary railway, is produced in the following manner:—37, is the fly-wheel of a steam-engine, and 38, is the crank, by which motive power is communicated from the engine to the shaft 39. Rotary motion is communicated to the spur-wheel *o*, on the axle of the main drum, by the pinion 40, on the crank-shaft; and the mechanism for effecting the turning-round motion is actuated by the bevil-pinion 41, on the same shaft; which pinion gears into a similar one 42, at the end of the hollow shaft 43, (see fig. 3.) On the hollow shaft 43, are also mounted two small bevil-pinions 44, and 45, either of which may be brought into gear with the large bevil-wheel 46, as required. Inside the hollow shaft 43, is a sliding-shaft, to which the small bevil-pinions 44, and 45, are connected, by means of pins or catches, which pass through slots in the hollow shaft; therefore, by moving this sliding-shaft to and fro in the hollow shaft, the pinion 44, may be thrown out of gear with the bevil-wheel 46, and the other, 45, thrown into gear, or *vice versâ.* This part of the machine is worked by means of the short lever 47, mounted on the shaft 48. At the other end of the shaft 48, and on the other side of the machine, is a hand-lever 49, by which the shaft 48, and lever 47, are worked. At the back of the large bevil-wheel 46, and on the same shaft, is mounted a cog-wheel 50, (see plan view); the shaft is made hollow throughout part of its length, and has also another cog-wheel 51, mounted on it, which is connected to a sliding-shaft inside, in a similar manner to the bevil-pinions 44, and 45, and may, accordingly, be thrown out of gear when required. This latter wheel gears into the pinion 34, on the shaft of the chain-pulley 33; and, therefore, when motion is communicated to it from the steam-engine, through the wheel-work just described, it causes the crane-jib and horse-shoe pulley to swing round, either to the right or to the left, according to which of the bevil-pinions 44, or 45, is in gear with the large bevil-wheel 46; and when the shovel or scraper has deposited its load, the horse-shoe pulley and crane, with the scraper at its end, are swung back into their original position, by merely reversing the gearing of the two bevil-pinions 44, and 45.

The various movements of the machine, in cutting away, turning round, and emptying the shovel of its load at the proper place, are as follow:—When commencing operations, the shovel or scraper stands in nearly a vertical position, with the steel points towards the ground, and is forced into the earth by the weight of the scraper itself; then, by communicating motion to the large spur-wheel, *o*, by means of the pinion 40, on the crank shaft, the main drum *n*, is made to rotate, and coil the chain-tackle *j*, *j*, around its periphery, which tackle, through the intervention of the indented chain-pulley *l*, and shaft and pinions *p*, *q*, *r*, and *s*, actuates the mechanism on the diagonal arms *e*, *e*; and then the friction-pulley *u*, and brake *v*, before described, being kept at proper tension (by the attendant on the platform 26, pressing on the hand-lever *z*,) the spiral-grooved pulley 23, round which the chain 24, passes, is made to revolve, and force forward the shovel or scraper into the ground. When the shovel or scraper is forced far enough into the ground, the brake on the pulley *u*, may be relaxed, and the brake on the pulley 18, tightened, by pressing on the hand-lever 20. At the same time that this is going forward, the shovel or scraper is being raised or lifted up by the chain-tackle *j*, *j*, at the end of the crane, and thus the shovel or scraper has a double motion,—a thrusting-forward motion from the arms 25, while tension is on the pulley *u*, and a lifting motion by the chain-tackle *j*, *j*. When the shovel has attained its proper altitude and becomes filled, these motions are stopped, and the actuating parts thrown out of gear; but the shovel is kept suspended, and prevented from running back by means of the brake and pulley 18; an attendant, who stands on a platform at the hinder part of the machine, then puts the turning-round motion into gear, by pressing forward the hand-lever 49, and bringing one of the small pinions 44, or 45, into gear with the large bevil-wheel 46; but should the attendant behind be inattentive and not do so, the man in front can throw this part of the machine into or out of gear by means of the long rod 52, one end of which is furnished with a horizontal lever, having two handles 53, and the other end is connected to the upper part of an upright rod 47*, which is a continuation of the lever 47. When the crane and scraper have been swung round, and stopped over the place of deposit, the scraper is emptied by the attendant in front of the crane-post pulling back the hand-lever 54, at the end of the rod 55. The other end of this rod is connected by means of a jointed rod or chain to the pin or bolt *i*, which holds in the bottom or end of the scraper, by means of a catch; and when this bolt or pin is withdrawn, the bottom of the scraper (which is hung upon hinges at *h*,) falls, and allows the contents thereof to be deposited in their proper receptacle, at which time the teeth *g*, of the scraper will be in a position pointing upwards.

The scraper having discharged its load, it must be brought back into its original position, so as to be ready to commence operations again. This is effected by loosening or relaxing the friction-brakes of the mechanism in connection with the arms 25, and putting the wheel-work out of gear by means of the hand-lever *z*. At the same time the man behind must press forward the hand-lever 10, and thereby throw the coupling or clutch 6, out of gear with the spur-wheel *o*, which then turns loosely on the shaft, thus releasing the main drum. He must also press down the foot-lever 14, which, by turning the tumbling-shaft 3, will raise the clicks, palls, or catches 5, from the ratchet-wheel 4, and at the same time tighten the band 2, round the friction-pulley 1, for the purpose of preventing the main drum from revolving too rapidly. The shovel or scraper will then descend from its elevated position, in a diagonal direction, to the ground, ready for a second operation. The bottom or end of the scraper closes, in its descent, by its own gravity, as the points or teeth of the scraper will then point towards the ground. While the scraper is descending, the turning-round motion is reversed, and the crane and horseshoe pulley will be brought back into their original position.

When it is required to move the machine forward on the temporary railway, the cog-wheel 51, at the hinder part of the machine, must be thrown out of gear with the pinion 34, which forms a part of the turning-round motion; and an intermediate wheel 56, represented by dots in figs. 2, and 3, is brought into gear with the toothed wheels 50, and 57, the latter of which is mounted on the axle of one of the running wheels. The whole machine is steadied and strengthened by bracings of iron, or other materials, and is also firmly secured to the ground by lateral bracings 58, which extend from each side of the machine, and are firmly bolted, or otherwise fastened to sleepers, placed there for that purpose.

The second part of the invention, viz., the machine for dredging and deepening rivers, harbours, and other underwater-works, is shewn in figs. 4, and 5;—fig. 4, being a longitudinal section of the apparatus, and the vessel containing the same, and fig. 5, a plan view. The machinery is actuated by a steam-engine, whose boiler is shewn at A. The boiler is provided with a steam-chamber B, for the purpose of preventing the water from priming or passing over into the cylinders C, C, which are supplied with steam by the pipes D, D. These pipes are furnished with a throttle-valve E. The cross-heads of the engine are shewn at F, F, the connecting rods at G, G, and the cranks at H, H. Each cylinder has an eccentric and rod I. The crank-shaft is mounted in bearings J, and is furnished with a fly-wheel K. On the crank-shaft is mounted a pinion L, which actuates the main drum N, by gearing into a large spur-wheel M, on the shaft of the main drum. This shaft is provided with a ratchet-wheel O, which is furnished with suitable palls, clicks, or catches, as in the land machine; and the main drum N, is also provided with a friction-pulley and band P, which is connected with a rocking-lever Q. At the other end of the rocking-lever is a small lever R, for the purpose of raising the palls, clicks, or catches from the teeth of the ratchet-wheel.

The wheel-work for turning the crane round is situated at the end of the crank-shaft, and consists of three bevil-wheels T, T^1, and T^2. The wheel T, at the end of the crank-shaft, is made fast thereto; but the other two revolve loosely on the long longitudinal shaft U, on which they are mounted, except when acted upon by the clutch V. This clutch is moved along the shaft U, and made to gear with either of the two bevil wheels by means of the rods S, S, which proceed to the back of the engine, and terminate in a hand-lever S^1.

On the end of the longitudinal shaft U, nearest the bow of the boat, is mounted a cast-iron pulley W, which is connected with a similar pulley Y, by a belt X; and, resting on the centre of this belt X, is a friction-roller or pulley Z, which may be raised or lowered at pleasure, to increase the tension of the band X, on the pulleys W, and Y. On the same shaft as the pulley Y, is a bevil-pinion *a*, fig. 4, that gears into the teeth of the large bevil-wheel *b*, mounted on the lower end of the hollow mast *c*, to the upper part of which the crane *d*, is connected by a strong metal socket *e*. The hollow mast consists of several parts, viz., first, the inside hollow mast *c*, having at its upper end the metal socket *e*, for receiving the end of the crane; second, an outside hollow mast *f*, that is firmly secured to the deck of the vessel. The inside hollow mast is supported upon the angular edges of the upper part of the outside hollow mast *f*, and turns freely upon it in a horizontal direction. The lower part of the outer hollow mast *f*, is surrounded with a strong moveable circular framing or carriage *g*, furnished with eight anti-friction rollers *h*, which revolve upon a circular iron way, firmly fixed to the deck of the vessel. The outer end of the crane *d*, is steadied and strengthened by side-braces *i*, which pass through or are fastened in ears *j*, at the upper part of the hollow mast *c*, and are connected at their lower ends to the moveable framing or carriage *g*. In order to counterbalance the weight of the shovel or scraper at the end of the crane, a box *k*, is placed on the back part of the moveable carriage *g*, and filled with iron or lead, thus taking the strain in some measure off the mast. This balance-box may, however, be dispensed with, by employing a cast-iron rail with an overhanging flange, which must be firmly secured to the deck; and the conical rollers *h*, of the moveable carriage may be arranged so as to bear against the under side of the said overhanging flange, and by this means take a portion of the strain off the mast, as before. The outer end of the crane *d*, and side-braces *i*, are bolted firmly together, and supported by the angular centre-brace *l*, furnished at its lower end with a double cone-roller *m*, which rolls on the rail *n*, extending entirely round the semicircular end of the boat. This angular brace *l*, is further strengthened by means of upright and oblique stays *o*, and one of the arms of the carriage *g*, which extends out of the front of the boat for that purpose. The shovel or scraper *p*, is connected to the end of the long arms *q*, by the braces *r*. It is suspended from the end of the crane by chain-tackle *s*, in a similar manner to that described in reference to the land machine. The chain *s*, passes along the upper side of the crane over a pulley *t*, at the top of the mast, then downwards through the centre of the mast, and round a pulley *u*, mounted in bearings that turn horizontally on a centre, so as to allow the groove of the pulley *u*, to accommodate itself to the line the chain takes in being wound on to the main drum.

On the shaft of the pulley *t*, at the top of the mast, is mounted a bevil-pinion *v*, gearing into a similar one on the end of the diagonal shaft *w*. At the lower end of this shaft is another bevil-pinion, working in a similar one, on the horizontal shaft *x*, which works the thrusting motion of the shovel or scraper. The friction-clutch or pulley *y*, on the end of the shaft *x*, is the same in principle as that used in the other machine, but somewhat different in construction, as, instead of being cast on the back of the bevil-pinion, it is connected to the hollow shaft of the same, and placed inside the framing. The other arrangements of the clutch are precisely the same as in the land machine, being acted upon by a sliding rod running through the hollow shaft, and worked by hand-levers. *z*, is the holding-fast brake, commanded by the left hand of the attendant, so that by means of the two handles the shovel may be sent down with any required force, holding it or letting it go at pleasure, the whole being at the command of the brakesman. The shaft *x*, gives motion, by its pinion 1, to a wheel 2, on the next shaft, on which also are two pinions 3, which gear into racks on the under side of the scraper arms *q*. On the shaft of the wheel 2, and pinions 3, is a triangular metal frame 4, which carries a roller 5, at each of its upper corners, for the purpose of keeping the racks on the under side of the scraper arms *q*, in gear with the pinions 3.

When the shovel or scraper has received its load from the bottom of the river, and has been raised above the top of the water to the proper height for depositing it in a barge, the crane and scraper must be turned round, until the latter arrives in a position immediately above the barge. The machinery for effecting this object is different from that described in the land machine. The large horse-shoe pulley and chain, together with the chain-pulley, cog-wheels, and hollow shafts of the reversing or turning-round motion, are entirely done away with; and, in place thereof, the large bevil-wheel *b*, the pinion *a*, the long longitudinal shaft U, and the bevil-pinions T, T^1, and T^2, with the clutch V, are employed. By this means the turning-round motion is much simplified. The manner of communicating rotary motion to the shaft U, either to the right or left, for the turning-round motion, or to actuate the propeller at the stern, has been before explained; and rotary motion having been communicated to the pinion *a*, on the axle of the pulley Y, from the pulley W, by means of the band X,—this pinion *a*, by gearing into the large bevil-wheel *b*, will cause the latter to turn slowly round on its axis; and, as the wheel is fastened to the lower end of the hollow mast, the mast, together with the crane *d*, and moveable carriage *g*, *g*, may be made to move round in either direction. The turning-round motion of the crane is regulated and arrested by means of the friction-pulley and band 6, which is connected to the boss or axle of the large bevil-wheel *b*, and is worked by the engine-man by means of the long rod and hand-lever 7, or it may be controlled by the man in front, by means of a foot-lever or treadle. It will be evident, (after perusing the above description), that there are many parts in the one machine equally applicable to the other; for instance, instead of employing the large horse-shoe pulley and chain gearing, together with the complicated turning-round motion at the back part of the land machine, the large bevil-wheel *b*, pinion *a*, and bevil-pinions T, T^1, and T^2, of the under-water machine, may be substituted. Or, instead of the thrusting-forward motion of the scraper being actuated by the pulley at the top of the crane-post, it may be worked from below, and the whole arrangement of the wheelwork on the diagonal arms modified and changed. Many other alterations may also be made in the mechanical arrangements.

The patentee does not confine himself strictly to the form or arrangement of all the parts exhibited in the drawings, as they may be varied, without departing from the general features herein set forth; but he claims such constructions and arrangements of parts as will effect the objects of digging, taking up, and removing earthy matters, in the way described, viz., by means of a pendulous scoop, attached to a crane or elevated beam, capable of turning horizontally, such scoop and its appendages being worked in the manner above stated, by chains and toothed gear, actuated by a steam-engine, or other first mover; the whole of the machinery being mounted upon a moveable carriage or stationary platform, or in a vessel floated upon the water.—[*Inrolled in the Petty Bag Office, September*, 1842.]

Specification drawn by Messrs. Newton and Son.

To ALEXANDER PARKES, *of Birmingham, in the county of Warwick, artist, for improvements in preparing solutions of certain vegetable and animal matters, applicable to preserving wood and other substances, and for other uses.* —[Sealed 27th June, 1843.]

THIS invention consists in preparing solutions of vegetable and animal matters, by the employment of *eupion*, or the bisulphuret or other sulphuret of carbon. The vegetable matters referred to are India-rubber, gum mastic, and other gums and resins; and the animal matter is phosphorus.

To form a solution of India-rubber, the patentee adds to each half pound of that substance two pounds of either of the above solvents, (preferring the bisulphuret of carbon, on account of its rapid volatilization,) which he says will dissolve it, without heat, quicker than any other solvent hitherto employed; and the solution, thus produced, is passed through a linen or other strainer, to remove any impurities that may exist in the India-rubber. This solution is now ready for use, either in combination with other substances, such as sulphur, for the purpose of impregnating wood; or alone, as a waterproof coating; it should be kept either in closed vessels, or under water, to preserve its moisture. For some purposes, the solution is made by adding a quarter of a pound of bisulphuret of carbon, and three pounds of turpentine or naphtha, to each pound of India-rubber.

When a solid mass or block is required, seven pounds of the bisulphuret of carbon are added to every ten pounds of the India-rubber; and this mixture, after remaining in a close vessel for about two hours, will be soft enough to be kneaded by hand or machinery, and formed into blocks. These blocks may be dried in the open air; but it is preferred to place the moulds, containing them, in a stove, heated to from 70° to 105° Fahr., with a refrigerator attached, to collect the bisulphuret of carbon, as it passes off. After this drying is effected, the blocks may be cut into threads or strands, if desired, which will, according to the patentee's statement, possess the original elasticity of undissolved India-rubber.

The bisulphuret of carbon, or the other solvent, is also used, as above mentioned, for dissolving gum copal, mastic, amber, lac, or other gums and resins, to be employed for preserving wood, manufacturing varnishes, and other uses; and, for some purposes, a portion of India-rubber, in solution, may be likewise mixed with the gums or resins. Six pounds of the solvent may be used to each pound of gum or resin; but these proportions will vary according to circumstances. The addition of one ounce of camphor, or four ounces of sulphuric ether, will facilitate the action of the solvent above named.

The solution of phosphorus is prepared by adding to each pound of that substance fifteen pounds of the bisulphuret or other sulphuret of carbon, and then thoroughly agitating the mixture. This solution is applicable to various uses; and, amongst others, the patentee employs it for obtaining deposits of metal upon non-metallic substances, either by combining it with the substance on which it is to be deposited, as in the case of wax, or by coating the surface thereof. Any of the known preparations of wax may be treated in this way; but the one preferred by the patentee is composed of from six ounces to eight ounces of the solution, five pounds of wax, and five pounds of deer's suet, melted together at a low heat, on account of the inflammable nature of the phosphorus. The article formed of this composition is acted upon by a solution of silver or gold, in the manner hereafter described, with respect to articles which have been coated with the solution.

If the solution is to be applied to the surface of the article, an addition is made to it of one pound of wax or tallow, one pint of spirits of turpentine, and two ounces of India-rubber, dissolved, with one pound of asphalte, in bisulphuret of carbon, for every pound of phosphorus contained in the solution; the wax or tallow being first melted, the solution of India-rubber and asphalte is stirred in; then the turpentine, and after that the solution of phosphorus is added. The solution, prepared in this manner, is applied to the surfaces of non-metallic substances, such as wood, flowers, &c., by immersion, or brushing; the article is then immersed in a dilute solution of nitrate of silver, chloride of gold, or other suitable metallic solution, and in a few minutes the surface is covered with a fine film of metal, sufficient to ensure a deposit, of any required thickness, on the article being connected with any of the electrical apparatus at present employed for coating articles with metal. The solution, preferred to be used, is prepared by dissolving four ounces of silver in nitric acid, and afterwards diluting the same with twelve gallons of water; the gold solution is formed by dissolving one ounce of gold in nitro-muriatic acid, and then diluting it with ten gallons of water.

The patentee does not confine himself to the precise details herein described; and he makes no claim to the various applications, herein suggested, of the solutions of vegetable and animal matters; but he claims obtaining solutions of the vegetable and animal matters, herein particularly described, by combining therewith *eupion*, or bisulphuret of carbon, or other sulphuret of carbon.—[*Inrolled in the Inrolment Office, December*, 1843.]

To SAMUEL SPARKES, *of Wellington, in the county of Somerset, foreman and superintendent of a woollen manufactory, for his invention of certain improvements in machinery for carding wool, cotton, and other fibrous materials.*—[Sealed 10th June, 1843.]

THESE improvements in machinery for carding wool, cotton, and other fibrous materials, consist in a peculiar adaptation of endless bands of wire-cards to a carding-engine, by means of which equal quantities of the fibrous materials are taken from the main drum or cylinder of the carding-engine, in a great number of distinct bands or strands of continuous slubbings or rovings. In effecting this object, no material alterations are made in the constructions of the carding-engines from those usually employed for carding fibrous materials, but only so far as regards the peculiar adaptation and arrangement of endless card-bands.

Fig. 1, Plate XI., represents a section of the improved carding-engine, taken longitudinally in a vertical direction; shewing the arrangement of the endless card-bands, and the manner in which they take the fibres of the material under operation from the main carding cylinder, and deliver them in continuous bands of slubbing or roving, to lapping rollers, or bobbins, or other winding-on apparatus. Fig. 2, is a horizontal view of the machine, as it would be seen when looking upon it from above. A, A, represents the main cylinder of the carding-engine, covered with wire-cards as usual; B, is a plain cylinder, or drum, in the place of the ordinary doffer-cylinder, over the periphery of which the series of endless card-bands *a*, *a*, *a*, are passed. These bands of wire-cards are arranged in two series, half of them passing over the roller C, and half over the roller D, and in order to distend and conduct the two series of bands properly, the several tension rollers E, E, E, E, are employed. All the rollers C, D, and E, E, E, E, have annular grooves formed round them, for the purpose of receiving the bands severally, and thereby guiding them in their proper courses. The card-bands used by the patentee are made of fillets or strips of leather, or firm cloth, or any other suitable material, with the wires set in them, in the usual way; and they may be about an inch broad; consequently, the several annular grooves in the rollers, which are made to receive the bands, should be very little more than an inch in width.

The main carding-cylinder A, and the cylinder B, are made to revolve in the direction of the arrows, shewn in fig. 1, by the means usually employed in driving carding-engines; and all the other guide and delivering-rollers may be similarly actuated at the required speeds, which may be varied, under circumstances, at the will of the operator. When the working parts of the carding-engine are thus put into rotary motion, the fibres of the material under operation will be taken off, doffed, or stripped, from the main cylinder A, in a horizontal line from end to end of the cylinder, by the several endless travelling card-bands *a, a, a,* all operating at the same time; these bands being made to travel, in their endless course, by the friction of the contact of the backs of the bands with the periphery of the revolving cylinder B; or the bands may be made to travel by any other convenient means.

When the fibres of the material, operated upon by the carding-engine, are brought, by the several card-bands, nearly opposite to the several pairs of drawing-off rollers F, F, the narrow sliver, from each band, may be doffed by a doffer-comb; but it is preferred to conduct the end of each sliver between travelling-straps G, which pass laterally in opposite directions, by means well known, and thereby slightly twist the fibres of the material into a thread, roving, or slubbing, giving it a degree of tenacity, which enables the slivers to be drawn off the bands, without the use of a doffer-comb. The slubbings or rovings are then passed between the drawing-rollers F, and guided to the taking-up rollers or bobbins H, upon which they may be wound, or the rovings or slubbings may be taken up from the bite of the drawing-rollers in any other mode that may be found convenient. It will be observed, that under this arrangement the card-bands doff or strip the fibres of wool, cotton, or other material from the main-carding cylinder simultaneously, and in one horizontal line parallel to the axis of the cylinder, by which means equal quantities of the carded material are taken off, and the slubbings or rovings are thereby all produced of equal thickness and uniform substance.

Although the bands are represented as being divided into two series, this is not absolutely necessary, but they are so arranged, in order that the whole of the carded material, taken by each individual band from the main cylinder, may be carried onward to form each distinct sliver, without the risk of one band robbing another of its material as it proceeds, which might be the case if they travelled side by side in the same plane. It is also more convenient, by affording greater space for the drawing-rollers, and, if thought desirable, trumpet-tubes might be placed beyond the drawing-rollers, to give a slight degree of twist to the slubbings or rovings; this, however, is well known, and forms no part of the present invention. The arrangement of the series of card-bands ought to be all coincident, and the slivers should be all made to pass through or between a series of drawing-rollers placed in one horizontal range. Also, the bands might be divided into more than two series if desired, but the arrangement must be such as to allow all the endless card-bands to take off, strip, or doff the carded material at the same time, and in the same horizontal line of contact, from the main-drum or cylinder, or from a doffer-cylinder similarly placed. In the arrangement of the endless card-bands, divided into two series as shewn in the drawing, it has been found desirable to introduce an endless apron *z*, *z*, of silk, leather, or other suitable material, distended over two rollers *y*, *y*, across the whole width of the machine between the two series of card-bands, for the purpose of preventing the fibres of the carded materials being drawn from one band on to another at the parts where they separate. This endless apron is made to travel in the direction of the arrow, by the friction of contact of the cards against its upper surface, or, like the other parts of the machinery, may be driven by any convenient means. It may be here observed, that the lower one of the two tension rollers *y*, should be brought as nearly into the angle formed by the parting of the two series of bands as possible; for it is at that angle the fibres would be most likely to be drawn off by the neighbouring bands, if not guarded; and the endless apron is designed to prevent that taking place.

In conclusion, the patentee states his invention to consist in the peculiar adaptation of endless bands of wire-cards to a carding-engine in the ways shewn and described; by means of which he is enabled to take equal quantities of the carded material from the surface of the cylinder in a number of separate bands of continuous sliver, and to lead these separate bands to drawing-rollers, where they may be delivered in the form of distinct strands of slubbings or rovings, and may thence be taken up, wound, or lapped upon bobbins, or received on to or into other suitable receptacles, ready to be further operated upon by spinning machinery.—[*Inrolled in the Petty Bag Office, December,* 1843.]

Specification drawn by Messrs. Newton and Son.

To JOSEPH DANIEL DAVIDGE, *of Greville-street, Hatton-garden, in the parish of St. Andrew, Holborn, and county of Middlesex, machinist, for improvements in manufacturing certain materials as substitutes for whalebone, applicable to various useful purposes, and in the machinery for effecting the same.*—[Sealed 24th July, 1843.]

THESE improvements consist in the application of strips of metal, either rolled, drawn, or twisted into tubular forms, for various purposes to which whalebone is now applied; and also in suitable machinery for forming the same into tubes.

The advantages to be derived from the application of twisted strips of metal or metal tubes over the use of whalebone, are elasticity, durability, lightness, and economy; and the principal objects to which they may be applied, are riding and other elastic whips; whip-stems, as intermediate pieces between the thong and the handle; umbrellas and parasols, as the framing over which the cotton, silk, or other fabric is distended; stems for feathers, walking-sticks, fishing-rods, and ramrods; the flexible stems of brushes or apparatus for sweeping flues or chimneys; as substitutes for the pieces of whalebone or cane employed for stiffening the caps worn by boys and men, and a variety of other useful purposes.

Various modes of forming the tubes, either by twisting, rolling, or drawing the strips of metal, and a variety of mechanical contrivances for effecting these objects, may be suggested; but the method preferred by the patentee, is forming the tubes of strips of metal, by twisting the said strips helically or conically round a mandril in the following manner: Sheet-metal for forming the tube is cut into strips of the desired breadth, according to the stiffness intended to be given to the tube, and these strips are then twisted round a mandril. They are afterwards drawn several times through "draw-plates," in order to bring them to the required diameter: they may be passed through one, two, or more pairs of grooved rollers, and by altering the shape of the grooves therein, the tubes can be made to assume a circular, oval, square, or any other desired form. When this operation of drawing or rolling has been effected, the helical twists are in a compressed state, and only shew a space between them, when the tube is bent out of a straight line. The tube is then hardened and tempered, great care being taken to keep it straight, and if required, it may be turned and polished in a lathe, or ornamented in any other manner. It should be remarked, that the length of the strip of metal must be according to the length of the tube required, as no joining of the strip of metal can be effected, either during the operation of making the coil or afterwards; and the circumference of the mandril must not be less than the breadth of the strip of metal intended to be used.

In Plate XII., fig. 1, is a front view of the machine for making the elastic metal tubes, and fig. 2, is an end view of the same. *a, a,* is the frame-work; *b, b,* a bar on which a sliding piece *c,* traverses the whole length of the machine. The traverse motion is effected by means of the wheels *d,* and *e.* From the axle of the wheel *e,* proceeds a screw-shaft *f,* which passes through the lower end of the sliding-piece *c,* and has a bearing in the other end of the frame-work; and from the axle of the wheel *d,* is projected the mandril *g,* on which the tube or helical twist is formed: this mandril passes through an opening in the upper part of the sliding-piece *c,* a side view of which is shewn at fig. 3. The upper part of this sliding-piece is formed into a spring-clasp by being split down the centre, and it is made to bind against the mandril by means of the thumb-screw *h.* Immediately under this screw is an opening, through which the strip of steel or other metal is introduced, (see fig. 1,) in order to be wound on the mandril, and its end is attached to the mandril by being passed through an opening or slot at *i.*

The operation of the machine is as follows:—On rotary motion being communicated to the wheel *d*, the mandril *g*, is made to revolve, and carry with it the strip of metal, which is drawn through the slit before mentioned, in the spring-clasp or sliding-piece *c*; and the wheel *d*, being in gear with the wheel *e*, causes the latter to revolve, and carry with it the screw-shaft *f*, which, working into a corresponding thread cut in the sliding-piece *c*, causes it to move towards the end of the mandril, and the tube formed thereon is then withdrawn. Before commencing the making of another tube, the sliding-piece *c*, must be drawn to the other end of the machine by reversing the motion of the screw-shaft *f*.

The patentee claims, as his invention, "drawing, rolling, or twisting strips of metal, by any convenient means, into the forms of tubes or rods, to be applied to the purposes above mentioned."—[*Inrolled in the Petty Bag Office, January,* 1844.]

Specification drawn by Messrs. Newton and Son.

To William Davey, *of Bath, in the county of Somerset, slate merchant, for certain improvements in covering the ridges and hips of roofs of buildings with slate and other materials.*—[Sealed 31st July, 1843.]

These improvements consist in a peculiar mode of combining slates for forming the hips or upper angular ridges of roofs of buildings. In Plate XI., fig. 1, represents a detached portion of the improved hip, or ridge, as it would appear in perspective. Fig. 2, is a section taken transversely through the same. The slabs of slate, to form the hip or ridge of a roof, are shewn at A, A. They may vary from about half-an-inch in thickness, as circumstances shall render desirable. In area, the patentee has found lengths of from three to six feet, by from five to eight inches in width, will answer very well, but he does not confine himself to these dimensions. The edges of these slabs of slate being straightened and squared, the edges of the two slabs which are to meet in an angle above, are cut to suitable bevils, according to the required expanse or angle of the roof; and these edges being brought together, the two slabs are connected by any convenient means, as for instance by internal angle irons, or angular plates of metal, as represented at B, B, in the section fig. 2, which are secured to the slabs of slate by screws passed through them, or by any other convenient means, so as to hold the slabs firmly at the required angle. When this connection of the slabs has been effected, a rib or bead of slate, or metal, C, is placed upon the upper angle of the united slabs, and extends over the whole length of the slabs, covering their joint. This rib, or bead, is made fast in its place by screws, as shewn at fig. 2, or by any other suitable means. The form of the rib, or bead, C, is nearly cylindrical, and of about two or three inches in diameter, with an angular groove cut in it to fit on to, and cover, the top joint of the slabs; but it might answer equally well if formed elliptically, or with angular sides, provided that it were made wide enough to cover the joint sufficiently. It should be noticed, that care must be taken to charge the joints properly with white lead, or other cement, before the parts are put together, in order to effectually exclude wet. The patentee claims an improved ridge or hip, formed by combining the parts, as above described, for covering the edges of the roofs of buildings.—[*Inrolled in the Petty Bag Office, January,* 1844.]

Specification drawn by Messrs. Newton and Son.

To Mark Freeman, *of Sutton Common, in the county of Surrey, gent., for improvements in card cases.*—[Sealed 22nd August, 1843.]

These improvements consist in the application of certain mechanism to the interior of card cases, by means of which a single card may be readily withdrawn when required.

A card-case, with these improvements attached, is represented in Plate XI.; fig. 1, being a longitudinal section thereof; fig. 2, a transverse section, with the lid removed; and fig. 3, a horizontal section. Card cases are usually made upon a flat block, but the block used in the present instance is formed with two projections, for the purpose of forming corresponding recesses, *a, b,* in the bottom and side of the case. The withdrawal of a single card is effected by a spring *c,* the parts *d, e,* of which press against the inside of the case, and the part *f,* against the card nearest to it: this part *f,* is bent outwards at the bottom (see fig. 2,) sufficiently to pass under one card. The spring *c,* is connected with the lid of the case by a piece of metal *g,* so that, when the lid is raised, the spring will lift up one card; the remainder being retained in the case by a roughened spring *h,* at one side, and a piece of coarse cloth *i,* glued to the other; which cloth, by yielding to any inequality in the size of the cards, causes them all to be pressed against by the roughened spring.

When applied to what are called limp card cases, the spring *c,* is connected with the flap of the case by a strip of leather; (instead of the piece of metal *g,*) which is made so short that; on pulling up the flap, the spring will be raised. In these card cases the spring *h,* and piece of cloth *i,* are unnecessary; as the remainder of the cards will be retained by the pressure of the hand.

If preferred, the spring may be disconnected from the lid or flap, and moved by hand.

The patentee claims, as his invention, combining with card cases suitable apparatus for raising or moving one card at a time, and in such a manner that it may the more easily be taken hold of, separated, and withdrawn from the others contained in the case.—[*Inrolled in the Inrolment Office, February,* 1844.]

To John Collard Drake, *of Elm-tree-road, St. John's Wood, in the county of Middlesex, land surveyor, for improvements in lining walls of houses.*—[Sealed 22nd August, 1843.]

This invention consists in lining the walls of houses with calico, linen, or other suitable fabric.

The mode of applying this invention is represented at fig. 1, in Plate XI. *a,* is the cornice of the room, and *b,* the skirting board; *c*, *d*, are two pieces of the improved lining, applied to the wall; and *e*, is a division or portion of the wall prepared for the reception of another piece of lining, by the application of strips of calico or linen *f*, three or four inches wide, and coated on both sides with India-rubber cement, by which the edges of the piece of lining are to be held. The surface of the calico, or other lining, which comes next the wall, is coated with India-rubber, and its other side may be painted, either before or after putting up, or have paper-hangings applied thereto; if the lining is required to be sized, that should be done before it is affixed to the wall.

If it be desired to apply the above lining to a newly-built wall, as a substitute for the ordinary plaster, the surface of the wall is divided into compartments, by perpendicular and horizontal divisions or styles, about three or four inches wide; upon these styles Roman cement, or any other quickly-setting cement, is evenly laid, and the panels, between the styles, are filled in with a mixture of cement and sand, so as to render the walls perfectly even. When the cement is set, the styles are covered with a solution of India-rubber, and the strips of calico, prepared as above, are attached thereto, forming a substitute for the ordinary wooden battens; the operator then stretches the lining over, and attaches it to, the strips of calico upon the wall, bringing the perpendicular edge of each succeeding piece of the lining over the edge of the preceding piece, and then, by cutting off the overlap, a "flush or butting join" is formed.

Fig. 2, is an edge view of the apparatus by which the patentee applies the lining to the wall. It consists of two bars *g*, *h*, at the outer ends of which are two boards *i*, *j*, placed at right angles therewith; these boards will usually be fixed, and have diagonal stays; but when it is required to vary their relative position, for instance, in covering the walls of staircases, then, in place of the diagonal stays, a semicircular one is to be used, as represented at *k*, in the plan view, fig. 3; by means of which, with the set screw *l*, any desired inclination may be given to the boards. The bars *g*, *h*, are connected together by saddle-pieces *m*, *n*, which embrace both bars; the saddle-piece *m*, is secured to the bar *g*, and the saddle-piece *n*, to the bar *h*, by the clamps *o*. One of the clamps is shewn separately at fig. 4; it consists of two bars *o*, furnished with small points *p*, which pass through openings in the saddle-pieces into the bars *g*, *h*; the bars *o*, being retained in their proper position by slipping the loop or collar *q*, over them, and inserting the wedge *r*, between their outer ends. The lining is extended over the pieces of felt *s*, at the under sides of the boards *i*, *j*, and secured to the pins at the upper sides thereof; the bars *g*, *h*, are then moved endwise, by turning the screw *u*, which works in the standards *v*, projecting from the backs of the saddle-pieces, and the lining being thus stretched to the required extent, it is applied to the wall.

The patentee does not claim the application of India-rubber to fabrics, in order to render them impervious to damp; but he claims the mode of lining walls of houses by the application of calico or other fabrics, coated on the back with India-rubber, as above described.—[*Inrolled in the Inrolment Office, February*, 1844.]

To William Denley, *of Hans-place, Sloane-street, in the county of Middlesex, bricklayer, for his invention of certain improvements in the construction of fire-places, flues, and chimneys.*—[Sealed 21st September, 1843.]

This invention consists, firstly, in an improved method or improved methods of supplying air to fire-places to support combustion, and, also, in forming a hollow breast-plate for the fire-place; which hollow breast-plate is placed above or at the upper part of the fire-place, and being supplied with cold air, the air becomes warmed therein, and is then allowed to issue into the flue, and thereby assist or increase the draft up the chimney, and prevent it from smoking. Secondly, in constructing flues or chimneys of a series of earthenware tubes or pipes, either round, oval, or of any other convenient form, and set in brick-work in a peculiar manner. These earthen tubes are made of Stourbridge clay, or other fireproof material, and glazed inside, to prevent, as much as possible, the adhesion of soot or dust. Thirdly, in the peculiar construction of downward flues leading from each chimney and fire-place to the basement story of the house; whereby the chimneys can be swept or cleansed, and the dust and ashes from the fire-place removed, without the necessity of entering the room. In Plate XII., fig. 1, represents a vertical section taken through the middle of a stack of chimneys constructed upon this improved plan; A, B, C, D, are four fire-places, and *a*, *b*, *c*, *d*, are the chimneys or soot-flues appertaining thereto, the peculiar construction of which will be hereafter more particularly described. E, is the main air-flue; whereby air is brought from the external atmosphere at the basement story, and supplied, in a cold or warm state, by branch-pipes to the fire, to support combustion, and to the chimney, to increase the draft. Each fire-place is also furnished with a downward flue, as seen at *a**, *b**, *c**, whereby the soot from the chimney, and the dust and ashes from the fire-place, are removed. These downward flues merge in their descent into one, and at the basement story of the house ultimately empty themselves by one aperture into a fire-proof soot-receiver or chamber *f*. By this means, it will be seen that the chimney communicating with this soot-receiver *f*, may be swept from the top of the house, without entering any of the rooms, except for the purpose of closing the registers, so as to prevent the soot from entering the room. Figs. 2, and 3, represent horizontal sections of fig. 1, taken on the lines 1, 2, and 3, 4. The improvements upon fire-places will be seen best in the enlarged views, figs. 4, 5, and 6; fig. 4, being a vertical section, taken through the centre of the fire-place; fig. 5, a partial front elevation, some of the parts being seen in section, the better to explain its construction; and fig. 6, a plan or top view.

The air to support combustion is supplied to the fire partly from the room, between the front bars, in the ordinary manner, but principally from the basement story, through the main air-flue E, by means of the horizontal branch pipe *e*, fig. 5, which enters the fire-place immediately below the fire-bars, and is furnished with a regulator *g*. The air from the pipe *e*, enters the fire between the fire-bars below, and also through holes *i*, *i*, made at the back of the grate as seen in fig. 4; it is also allowed to issue through the holes *j*, *j*, immediately before the front bars, as seen in all three figures.

The register plate *n*, of each fire-grate is constructed in such a manner as to exactly fit and close the downward flue, and prevent it from communicating with the chimney flue, as seen in fig. 4.

In order to increase the draft in the chimney, and supply it with a warm current, the air is conducted from the main air-flue E, and horizontal branch pipe *e*, up the vertical pipe *e**, into the hollow breast-plate *k*, *k*, as seen in fig. 5. This breast-plate is made of metal, and of a peculiar form, being bevilled off to an edge at its lower part. By constructing the breast-plate in this manner, the draft is much improved; for when the breasts of the chimneys are built of bricks, in the ordinary manner, they are made square, and unless the grate is set far back, the smoke is sometimes prevented from ascending the chimney, and drives into the room. The hollow breast-plate *k*, being placed above the fire, as the cold air is admitted into the hollow, it quickly becomes heated, and passes out through the grating *l*, into the chimney, as shewn by the arrows, fig. 4.

Instead of making the upper part of fire-places, or the commencement of the flues, of a great width, as is generally the case, the patentee proposes to contract this space, in order to prevent an accumulation of cold air, which often causes chimneys to smoke when a fire is first lighted, and before the body of cold air becomes sufficiently heated to cause it to ascend.

The commencement of the flue is, according to this improved plan, formed by a funnel-shaped tube, supported by an iron plate *m*, which is stepped into the wall or brickwork, as seen in figs. 4, and 5. This plate is the foundation upon which the chimney tubes rest, and, in order to prevent the tubes from shifting, a shoulder is formed on the plate, into which they are cemented, as shewn in figs. 4, 5, and 7. The method of constructing the remaining portion of the chimney flues will be better understood by referring to the latter figure, which represents a partial vertical section of a chimney flue on an enlarged scale. The different lengths of tubing are jointed together by means of metal bands, and at convenient distances metal plates, similar to the foundation plate *m*, are stepped into the wall, to assist in supporting the superincumbent weight. Chimneys constructed on this plan have not been found to require chimney-pots, and therefore the flues in fig. 1, are shewn as terminating flush with the brick-work; but, if thought desirable, chimney-pots or tubes may be employed; and, in such case, the upper part of the chimney shaft may, if required, be made ornamental, so as to partially conceal the termination of the pots or tubes from view, as seen in fig. 8; the ornamental railing being also useful to baffle the wind, and prevent it from beating down the chimneys. Upon referring to the plan view, fig. 2, it will be seen that, at the upper part of the chimneys, spaces are left round the tubes, for the free circulation of air; moreover, the air-flue E, terminates in these spaces, within a few feet of the top of the house, as seen in figs. 1, and 2. The spaces round the several tubes communicate with one another by openings made in the brick-work, as seen at fig. 2, and by the air playing freely round the tubes, and ultimately ascending into the atmosphere, it has a tendency to carry off the smoke from the chimneys.

The downward flues, before mentioned, designed for the purpose of carrying off the dust and ashes from the fire, and also the soot from the chimney flues, when the latter are swept, are constructed of the same description of materials, and put together in exactly the same manner as the chimney flues; but that part of the flue which is placed immediately behind the grate should be oval, as seen best in fig. 8, for the purpose of obtaining a greater width than could be conveniently obtained if cylindrical tubes were employed. The soot and dust receiver *f*, is made fire-proof, and kept close, in order to prevent the possibility of any live coal from the fires igniting the soot, or other substances that may be therein.

The patentee states that he is aware of downward flues having been heretofore employed, whereby chimneys may be swept, and the soot, dust, and other similar products of combustion carried off, without entering the apartments. He does not, therefore, intend to claim the employment of downward flues for this purpose; nor does he claim supplying fire-places with air by means of an air-flue, communicating with the atmosphere; but he claims, firstly, constructing chimneys or sóot flues, and also the downward flues, as above described, of oval, cylindrical, or other conveniently shaped earthenware tubes, set in brickwork; Secondly, the employment of a hollow breast-plate, above fire-places, and supplying it with air as above described. And also the peculiar method, above described, of supplying air to the fire for combustion, and to the soot-flue or chimney, for increasing or assisting the draft.—[*Inrolled in the Rolls Chapel Office, March*, 1844.]

Specification drawn by Messrs. Newton and Son.

To Richard Boote, *of Burslem, in the county of Stafford, earthenware manufacturer's clerk, for certain improvements in pottery and mosaic work.*—[Sealed 5th October, 1843.]

This invention consists in improvements in forming designs on pottery, and producing the combinations known by the name of mosaic work.

In order to produce colored designs on grounds of different colors (such as a black design upon a white ground, or *vice versâ*), the designs are first made from a mould, in the same manner as in the ordinary "figuring" process; they are then laid in the moulds used for forming the piece of ware, and the ground color, being poured on, will cover the back, and fill up the spaces between the different parts of the design; on leaving the moulds, the design will appear quite clear and distinct on the surface of the piece of ware. This process is applicable to the manufacture of tiles, bricks, quarries, panels and slabs of various shapes, &c.

Another method consists in cutting the design in paper, parchment, or any similar pliable substance, and laying it in the moulds, the halves of which are then fastened together, and the ground color is poured in; after which, the paper or other material is removed, and another color is poured in, to form the device, and the inner lining of the ware. When it has attained the desired thickness, the remaining liquid is withdrawn, and, after standing for a short time, the piece of ware will leave the mould with all the colors perfectly distinct upon its surface.

To produce a raised pattern, of a different color to the ground of the piece of ware, the design is carved, or otherwise produced, on the inside of the plaster of Paris moulds used for hollow ware, and filled in with the composition of which the raised figures are intended to consist; the halves of the mould being then fastened together, the slop that is to form the ground is poured in, and allowed to stand until the composition adhering to the mould, is of the thickness required for the body of the ware; the remaining fluid stuff is then withdrawn in the usual way. If the ground is of an expensive color, the slop only should be allowed to remain a sufficient time to give a very thin coating to the mould; it is then drawn off, and some other slop, of an inferior quality, is poured in, to form the inner lining of the piece of ware.

When designs of a mosaic or like character are required, the pattern is formed of compositions of various colors, and fixed upon the inside of the mould; the halves of the mould are then fastened together, and slop, of a suitable color for the ground-work (such as black or blue), is poured in; as soon as a sufficient thickness of clay has adhered to the mould, the remaining fluid stuff is withdrawn.

The patentee claims, as his invention, the several processes above described.—[*Inrolled in the Inrolment Office, April,* 1844.]

To Hugh Lee Pattinson, *of Bensham Grove, Gateshead, in the county of Durham, manufacturing chemist, for his invention of improvements in the manufacture of white lead, part of which improvements are applicable to the manufacture of magnesia and its salts.*—[Sealed 24th Sept. 1841.]

This invention consists in dissolving carbonate of magnesia in water impregnated with carbonic acid gas, by acting upon magnesian limestone, or other earthy substances containing magnesia in a soluble form, or upon rough hydrate of magnesia in the mode hereafter described, and in applying this solution to the manufacture of magnesia and its salts, and to the precipitation of carbonate of lead from any of the soluble salts of lead, but particularly the chloride of lead; in which latter case, the carbonate of lead, so precipitated, is triturated with a solution of caustic potash or soda, by which a small quantity of chloride of lime, contained in it, is converted into hydrated oxide of lead, and the whole rendered similar in composition to the best white lead of commerce. The manner in which these improvements are carried into effect is thus described by the patentee:—I take magnesian limestone, which is well known to be a mixture of carbonate of lime and carbonate of magnesia, in proportions varying at different localities, and, on this account, I am careful to procure it from places where the stone is rich in magnesia. This I reduce to powder, and sift it through a sieve of forty or fifty apertures to the linear inch. I then heat it red hot, in an iron retort or reverberatory furnace, for two or three hours, when, the carbonic acid being expelled from the carbonate of magnesia, but not from the carbonate of lime, I withdraw the whole from the retort or furnace, and suffer it to cool. The magnesia contained in the limestone is now soluble in water impregnated with carbonic acid gas, and, to dissolve it, I proceed as follows:—I am provided with an iron cylinder, lined with lead, which may be of any convenient size, say four feet long, by two feet and a half in diameter; it is furnished with a safety-valve and an agitator, which latter may be an axis in the centre of the cylinder, with arms reaching nearly to the circumference, all made of iron, and covered with lead. The cylinder is placed horizontally, and one extremity of this axis is supported within it by a proper carriage, the other extremity being prolonged, and passing through a stuffing-box at the other end of the cylinder, so that the agitator may be turned round by applying manual or other power to its projecting end. A pipe, leading from a force-pump, is connected with the under-side of the cylinder, through which carbonic acid gas may be forced from a gasometer in communication with the pump, and a mercurial gauge is attached, to shew at all times the amount of pressure within the cylinder, independently of the safety-valve. Into a cylinder of the size given, I introduce from 100 to 120 pounds of the calcined limestone, with a quantity of pure water, nearly filling the cylinder; I then pump in carbonic acid gas, constantly turning the agitator, and forcing in more and more gas, till absorption ceases, under a pressure of five atmospheres. I suffer it to stand in this condition three or four hours, and then run off the contents of the cylinder into a cistern, and allow it to settle. The clear liquor is now a solution of carbonate of magnesia in water impregnated with carbonic acid gas, or, as I shall hereafter call it, a solution of bicarbonate of magnesia, having a specific gravity of about 1.028, and containing about 1600 grains of carbonate of magnesia to the imperial gallon.

I consider it the best mode of obtaining a solution of bicarbonate of magnesia, from magnesian limestone, to operate upon the limestone after being calcined at a red heat in the way described; but the process may be varied, by using, in the cylinder, the mixed hydrates of lime and magnesia, obtained by completely burning magnesian limestone in a kiln, as commonly practised, and slaking it with water in the usual manner; or, to lessen the expenditure of carbonic acid gas, the mixed hydrates may be exposed to the air a few weeks, till the lime has become less caustic, by the absorption of carbonic acid from the atmosphere. Or the mixed hydrates may be treated with water, as practised by some manufacturers of Epsom salts, till the lime is wholly or principally removed; after which the residual rough hydrate of magnesia may be acted upon in the cylinder, as described; or hydrate of magnesia may be prepared for solution in the cylinder, by dissolving magnesian limestone in hydrochloric acid, and treating the solution, or a solution of chloride of magnesium, obtained from sea-water by salt-makers, in the form of bittern, with its equivalent quantity of hydrate of lime, or of the mixed hydrates of lime and magnesia, obtained by completely burning magnesian limestone, and slaking it as above. When I use this solution of bicarbonate of magnesia for the purpose of preparing magnesia and its salts, I evaporate it to dryness, by which a pure carbonate of magnesia is at once obtained, without the necessity of using a carbonated alkali, as in the old process; and from this I prepare pure magnesia, by calcination, in the usual manner; or, instead of boiling to dryness, I merely heat the solution for some time to the boiling point, by which the excess of carbonic acid is partly driven off, and pure carbonate of magnesia is precipitated, which may then be collected, and dried in the same way as if precipitated by a carbonated alkali. If I require sulphate of magnesia, I neutralize the solution of bicarbonate of magnesia with sulphuric acid, boil down, and crystallize; or I mix the solution with its equivalent quantity of sulphate of iron, dissolved in water, heated to the boiling point, and then suffer the precipitated carbonate of iron to subside; after which I decant the clear solution of sulphate of magnesia, boil down, and crystallize as before. When using this solution of bicarbonate of magnesia for the purpose of preparing carbonate of lead, I make a saturated solution of chloride of lead in water, which, at the temperature of fifty or sixty degrees of Fahrenheit, has a specific gravity of about 1.008, and consists of 1 part of chloride of lead dissolved in 126 parts of water. I then mix the two solutions together, when carbonate of lead is immediately precipitated; but, in this operation, I find it necessary to use certain precautions, otherwise a considerable quantity of chloride of lead is carried down along with the carbonate. These precautions are, first, to use an excess of the solution of magnesia, and secondly, to mix the two solutions together as rapidly as possible. As to the first, when using a magnesian solution, containing 1600 grains of carbonate of magnesia per imperial gallon, with a solution of chloride of lead, saturated at fifty-five or sixty degrees of Fahrenheit, one measure of the former to eight and a half of the latter, is a proper proportion; in which case there is an excess of carbonate of magnesia employed, amounting to about an eighth of the total quantity contained in the solution. When either one or both the solutions vary in strength, the proportions in which they are to be mixed must be determined by preliminary trials: it is not, however, necessary to be very exact, provided there is always an excess of carbonate of magnesia, amounting to from one-eighth to one-twelfth of the total quantity employed. If the excess is greater than one-eighth, no injury will result, except the unnecessary expenditure of the magnesian solution. As to the second precaution, of mixing the two solutions rapidly together, it may be accomplished variously; but I have found it a good method to run them in two streams, properly regulated in quantity, into a small cistern, in which they are to be rapidly blended together, by brisk stirring, before passing out, through a hole in the bottom, to a large cistern or tank, where the precipitate finally settles. The precipitate, thus obtained, is to be collected, washed, and dried in the usual manner. It is a carbonate of lead, very nearly pure, and suitable for most purposes, but it always contains a small portion of chloride of lead, seldom less than from one to two per cent., the presence of which, even in so small a quantity, is somewhat injurious to the color and body of the white lead. I decompose this chloride, and convert it into a hydrated oxide of lead, by grinding the dry precipitate with a solution of caustic alkali, in a mill, similar to the ordinary mill, used in grinding white lead with oil, adding just so much of the ley as may be required to convert the precipitate into a soft paste. I allow this paste to lie a few days; after which, the chloride of lead being entirely, or almost entirely, decomposed, I wash out the alkaline chloride, formed by the reaction, and obtain a white lead, similar in composition to the best white lead of commerce. I prepare the caustic alkaline ley by boiling together, in a leaden vessel, for an hour or two, one part, by weight, of dry and recently slaked lime, two parts of crystallized carbonate of soda (which, being cheaper than carbonate of potash, I prefer), and eight parts of water. The clear and colorless caustic ley, obtained after subsidence, will have a specific gravity of about 1.090; and, when drawn off from the sediment, must be kept in a close vessel for use.

The patentee claims, Firstly, the dissolving of magnesia out of magnesian limestone, and other earthy substances containing magnesia in a soluble form, by submitting the same to the action of water impregnated with carbonic acid gas; and also the dissolving of magnesia, by the same mode of operating, out of the impure hydrate of magnesia, obtained by the action of hydrate of lime on a solution of chloride of magnesium.

Secondly, the application of this solution of bicarbonate of magnesia to the manufacture of carbonate of magnesia, by which he is enabled to produce this latter substance (and from it pure magnesia), without the use of a carbonated alkali; he claims, also, the application of this solution of bicarbonate of magnesia to the manufacture of sulphate of magnesia, in the manner described.

Thirdly, the application of a solution of bicarbonate of magnesia to the manufacture of white lead, by precipitation, as described; any soluble salt of lead being used, but chiefly the chloride of lead; and, Fourthly, the application of caustic alkali to the precipitate obtained in the latter case, for the purpose of converting the small quantity of chloride of lead, in the precipitate, into hydrated oxide of lead. The patentee does not confine himself to any particular form of apparatus, provided the general character of the invention be retained; which is, to separate magnesia from earthy substances containing it, by means of water impregnated with carbonic acid gas, and to apply the solution of bicarbonate of magnesia, thus obtained, to the manufacture of magnesia and its salts, and to the manufacture of white lead by precipitation, in the manner already fully described.—[*Inrolled in the Inrolment Office, March,* 1842.]

To RICHARD GREVILLE PIGOT, *of Old Cavendish-street, in the county of Middlesex, gent., for his invention of improved apparatus for supporting the human body when immersed in water, for the purpose of preventing drowning.* —[Sealed 25th April, 1843.]

THE improved method of supporting the human body in the water, which forms the subject of this patent, is intended to give the greatest amount of auxiliary buoyancy to the human frame, in the smallest space consistent with efficiency, and with the least possible inconvenience to the wearer; it is adapted in form, and method of appliance, to that part of the human frame which more particularly requires an additional buoyancy, and, at the same time, it is applicable to all classes, and both sexes—of continual wearability, yet permitting at all times, by its form, of such convenient concealment, as shall render it imperceptible to the eye of the common observer.

Secondly, as from long immersion in the water, at inclement seasons, even the strongest and most proficient swimmers become chilled, and the physical powers of endurance so much paralyzed and perished, that, though supported by such an agent as the improved apparatus, few but the hardy and inured could survive a protracted immersion; it is of the utmost necessity, as a provision for the worst, that mariners and voyagers by sea should, as much as possible (in northern latitudes), clothe themselves warmly; whereby they will be enabled to resist much longer the chill incident to long immersion, which is more particularly felt about the kidneys and region of the loins; in which sensitive part the blood soonest loses its caloric, and entails that palsy so fatal to the physical powers, to retain which, and to keep up the warmth in the lower limbs and trunk, the apparatus is combined in such a manner that it is both a buoyant power and a protection from the chill of the water, as will hereafter be described.

In Plate XI., fig. 1, represents the form and external appearance of the invention, as a life-preserving shirt front, or chemisette, to be worn over the shirt, and assuming then the appearance of the front of that garment; containing within it an apparatus constructed with air-proof cells, of capacity proportioned to the weight and size of the wearer, communicating with each other, and simultaneously inflatable by means of the air-valve A, and enclosed between any two waterproof fabrics. When put on, by passing the head through the aperture B, the front of the apparatus assumes its place exactly over and upon the cavity of the chest and lungs; forming, as it were, an additional artificial lung, the lateral air-cells of which extending in a narrow band over either shoulder, expand into the two shoulder flaps C, C, that fall upon the scapulas, and are there confined by the ties *d, d.* The shoulder flaps are fastened down upon the back region of the lungs by the two loops *e, e,* suspended from their outer angles, through which the strings or bands *f, f,* affixed to the front of the apparatus, pass, and are then tied in front, whereby the whole is immoveably and safely fixed upon the chest and back, without the possibility of slipping; the whole shielding, by its position, the chest and collar bones from external injuries. The apparatus may be worn, either inflated, without inconvenience or unsightly appearance, or inflated only previous to being used, by means of the air-valve depending on the left side of the breast, close to the mouth. When worn alone as a bathing companion, it may be taken out of its covering, and used either with the shoulder flaps fastened down on the back in the way described, or by merely tying the front bands round the waist, when the shoulder flaps will rise, and form an agreeable support and pillow for the head, if the bather is floating on his back; thus greatly relieving the fatigue felt in the vertebræ of the neck by long immersion in the water. Upon the occasion of bathing with the apparatus as described, additional convenience is moreover felt by the use of the martingale *g*, which may be affixed to the bottom of the front, passed between the legs, and fastened either to buttons on the bottom of the inner angle of each flap, when worn down, or to buttons on the centre of the back of the waistbands. The addition of this martingale enables the buoyancy of the apparatus to diffuse its action, and lift equally the lower and more heavy parts of the body, as also to steady the buoyant power of the chest.

Fig. 2, shows the shirt front, or chemisette, in one, with a waterproof hose, for supporting the body, and, at the same time, resisting the evil effects of long immersion in the water. The lower garment, or hose, composing at once a foot and leg covering, worn with shoes, ascends in the form of a continuous hose or pantaloon, without opening, embracing the chest, under the breasts, by a waistband of broad India-rubber web, to which the chemisette is affixed; which belt, on immersion, prevents all access of water between it and the body, without inconvenient ligature. This garment is made of an inner casing of flannel, which, at the same time that it keeps up the warmth of the limbs and body, acts as an absorbent of all perspiration. The external covering of the hose is cloth, or other woollen fabric, having on its internal surface a light waterproof composition.

Fig. 3, shews the same form as fig. 1, with the addition of an inflatable cravat or stock, affixed to, and communicating therewith. Fig. 4, shews a modification of the same, without the shoulder flaps, or with decreased length thereof, as adapted to a mariner's woollen comforter; and fig. 5, as a rowing chemisette. Fig. 6, shews the apparatus as adapted to a civilian's cravat, or stock and tie, alike applicable to bathing, with the others, and recommended as a skating companion. Fig. 7, shews a slightly modified inversion of fig. 1, to be applied to upper male garments, such as mariners' jackets, waistcoats, coats, Guernsey frocks, &c., into which clothing it is admitted between the linings; applicable also to bathing, having strings and ties attached. Fig. 8, shews a modification of the same form, intended as a garment for females, in the form of a pelerine, covered according to the taste; applicable also without the latter, as a safeguard worn over the bathing dress. Fig. 9, shews the application of fig. 4, as adapted to children and lads for bathing. Fig. 10, shews the same form as fig. 1, adapted to the use of light troops, and boarding parties, in war time; of material and structure to be hereafter detailed, which, being then worn for an ostensible and public purpose, requires no concealment from the eye, by any covering assuming the appearance of a part of the dress. Figs. 11, represent, in two detached views, the mouthpiece, through which the air is blown to fill the air-cells of the various forms of apparatus described.

The patentee does not confine himself to any particular material for the construction of his apparatus, as it may be made of any waterproof fabric containing air-cells, either communicating with each other, and inflating simultaneously (which form of structure, for general purposes, is deemed the most economical, where air is the floating agent), or distinct and separate air cells, or air tubes of metal, or other material, or of cork, the pith of alder, and other vegetable productions, the buoyancy of which is made permanent, by preventing that tendency to gradual absorption which, otherwise, eventually destroys their floatability, and particularly as regards the cork, of which the interior of the apparatus adapted to light troops, &c., (see fig. 10,) is made. As cork is liable to decay, from access of insects, and from frequent contact with water (in which it soon loses one-fifteenth of its buoyancy), it is coated with a waterproof composition in thin solution, or any hydraulic varnish. The patentee claims the mode and form of the apparatus, and method of applying the same to the human frame, as above described, for the purpose of supporting the body in the water, and, as in fig. 2, of preserving the same from the effects of cold; he also claims the modes and forms by which the apparatus is covered and concealed from the eye, after the manner shewn in the drawings; and further, the use of independent and unconnected air-cells or air tubes, of metal, or other materials, as also of the pith of alder, and other vegetable productions, prepared as above detailed, and of the employment of cork, prepared and preserved, after the manner above expressed, from decay and absorption, when such materials and structure are employed for the purpose, and in the way above described.—[*Inrolled in the Petty Bag Office, October,* 1843.]

To James Gardner, *of Banbury, in the county of Oxford, ironmonger, for improvements in cutting hay, straw, and other vegetable matters for the food of animals.*—[Sealed 17th June, 1843.]

This invention consists in a peculiar construction of knives or cutters, to be used in chaff-cutting machines. In Plate XII., fig. 1, is a partial plan view of a double chaff-cutter, with the improved knives applied thereto; fig. 2, is a front view of the knives, shewing also the manner in which they are fixed for working; and fig. 3, is a section taken through the middle of fig. 2. *a, a, a,* are the knives or cutters, attached by bolts to the circular plate *b*; *c,* is the axle on which the plate and cutters are mounted, and motion is communicated thereto through the fly-wheel and handle upon the same shaft; *e, e,* are the ordinary rollers for conducting the hay, straw, &c., to the cutting edges. The object of the present invention is to obviate the difficulty generally felt in adjusting the cutters; and also to prevent them from springing against the surface of the mouth-piece of the machine. The face of the circular plate *b*, on which the cutters are fixed, is turned flat and true, and that part of the cutters abutting against the plate, is made to fit upon its flat surface. It will be readily perceived that, if the holes for the bolts in the plate and cutters correspond, the latter may be attached by any common workman. When the improvement is applied to a single chaff-cutting machine, two cutters, set in a line with each other, will be found sufficient. By reference to fig. 4, which is a section taken through the middle of a cutter, it will be seen that the cutting edge stands out from the plate *b*, but parallel thereto; the edge is sharpened on the side marked *.

The patentee states that he does not confine himself to the precise form of knives, provided the plane of the surface, and the plane of the edge are parallel; he claims the mode of constructing knives of chaff-cutting machines, as herein described.]—*Inrolled in the Inrolment Office, December*, 1843.]

To William Longmaid, *of Plymouth, accountant, for improvements in treating ores and other minerals, and in obtaining various products therefrom; certain parts of which improvements are applicable to the manufacture of alkali.*—[Sealed 22nd October, 1842.]

This invention consists in treating ores and other minerals, containing sulphur, with such proportions of common salt as to deprive them of all their sulphur, or nearly so; the metallic products resulting from such process are thus rendered more suitable for undergoing the subsequent operations necessary to obtain metals therefrom, and larger quantities than usual of sulphate of soda are produced, by the conversion of the salt into that substance.

Any ores, containing fifteen to twenty per cent. of sulphur (and, in some cases, even less than that quantity), may be subjected to this improved process, which the patentee prefers to carry on in the reverberatory furnace represented in Plate XII. Fig. 1, is a horizontal, and fig. 2, a vertical section of the furnace; it has four beds *a, b, c, d,* rising one above the other; the mixture of ore and salt is introduced on to the bed most distant from the fire, in order that the sulphur, given off at a comparatively low temperature, may be taken up by the salt; when the ore requires more heat to separate the sulphur, it is removed to a hotter bed.

The ore is first crushed and passed through a sieve of four meshes to the inch; the salt (which should be well dried, to prevent it from caking in the furnace) is then mixed with it in such quantities that the former shall exceed the weight of sulphur, contained in the ore, in the proportion of, at least, sixty parts of salt to forty of sulphur. The patentee states, that he generally uses a much greater proportion of salt, viz., one ton of that substance to each parcel of ore containing 5 cwt. 1 qr. 11 lbs. of sulphur. A mixture of about two-thirds of the ore with the quantity of salt to be used, is placed on the bed *d,* and left until thoroughly heated; after which it is turned over, from time to time, so that every part of it may come in contact with the atmospheric air passing through the furnace, and the remainder of the ore is added at intervals. This charge is moved in succession on to the beds *c, b, a,* and is followed by other charges; and, when the furnace is in full operation, a charge is drawn every twenty-four hours from the bed *a*; each of the three remaining charges is then moved forward to the next bed, and a fresh charge placed on the bed *d.* Steam may be occasionally admitted, with advantage, to the charge nearest the fire, to promote the oxidation of the minerals, and the evolution of muriatic acid; the operation appears to proceed best when this charge has been brought to a semi-pasty condition, or when the mass has a tendency to agglomerate, and seems to be moist on the surface; it soon begins to dry up, owing to the increased temperature to which it is exposed on the bed *a,* and the charge is eventually drawn in a granular condition.

The sulphate ash, obtained by this process, contains sulphate of soda, chloride of sodium, oxide of iron, a soluble salt of copper, and oxide of tin (if any tin existed in the ore), provided that mundic was the ore operated upon; if other ores are treated, different products will, consequently, be obtained. By lixiviating the ash, a solution is produced containing sulphate of soda, chloride of sodium, and a salt of copper; the insoluble residue contains the oxides of iron and tin; but the oxide of tin may be readily separated therefrom by washing. The copper may be separated from the solution by iron, or by lime, slaked in water, and forming a milk of lime. Iron precipitates the copper in a metallic form; but lime (which the patentee prefers to use) precipitates it as an oxide, associated with the slight excess of lime necessarily employed, and a small portion of sulphate of lime. It being then separated from the refined liquor, by filtration, requires to be well washed, to remove from it the sulphate of soda and chloride of sodium; and the liquors, thus obtained, are employed in the lixiviation of fresh sulphate ash. The precipitate is bulky, but, by filtration and drying, its volume is very much diminished, and it is then in a fit condition for being reduced to the metallic state by the usual metallurgical process.

The solution from which the copper has been separated, may be concentrated, by boiling, and poured into suitable vessels, to crystallize; the mother liquor may be again concentrated, and set aside to crystallize, or employed for the manufacture of alkali, by mixture with fresh lime. If the sulphate of soda be required only for the manufacture of alkali, the solutions, obtained by lixiviation, should be conveyed into a large tank, and from it the quantity of liquor containing the desired amount of sulphate of soda, may be run on its equivalent of newly-burnt lime; by which means the water of solution is either absorbed, or expelled by the heat evolved in the slaking. But should the solution be so weak that the heat evolved from the requisite quantity of lime would not be sufficient to expel the whole of the water, the lime, after being treated with as much of the solution as will bring it to a thick pasty condition, may be thrown upon a flue at the end of a black ash furnace, or upon the third bed of a black ash furnace, where, as evaporation proceeds, the remainder of the solution may be gradually added. By these means a more perfect mixture of the sulphate of soda with its equivalent of lime is obtained, than by the usual process of mixing the slaked lime and dry sulphate of soda in powder.

The patentee claims the mode of treating ores and minerals containing sulphur, to obtain various products therefrom, by applying common salt, in the proportions herein explained, to take up the sulphur, and to manufacture alkali.—[*Inrolled in the Inrolment Office, April,* 1843.]

ON THE LAWS RELATING TO LETTERS PATENT FOR INVENTIONS.

No. XV.

THE PATENT LAWS OF THE SOUTH AMERICAN STATES OF NEW GRANADA, PERU, AND CHILI.

Of all the South American States, Brazil and Chili alone appear to possess a fundamental law, by which the exclusive use of new and useful inventions is vested in the authors or proprietors thereof, for a limited period, as is the case in most European countries. Still, however, the governments have not lost sight of the importance of the subject, and the ultimate benefits likely to ensue from granting protection to the inventors of useful improvements in the arts. By the constitution of New Granada and Peru, the legislature is empowered to grant privileges or patents, under certain conditions, according to the circumstances of the case. Every applicant for a patent will, therefore, if the grant is allowed, be subject to such conditions as the Government may think fit to impose for the protection of the people generally; and in order that inventors, desirous of introducing new manufactures into these countries, may understand the nature of the restrictions to which they are liable to be subjected, we have given below translations of Acts of Congress obtained for the exclusive use, in these states, of an invention lately introduced; a copy of a patent granted by the President of Chili is also added. No government charges are made for privileges of this kind in New Granada and Peru; and if interfering applications from different parties appear, for an exclusive protection to the same invention, (as was the case with one of those hereafter cited,) the Government will attentively examine the claims of both parties, and adjudge the patent right to the real inventor; but when such an interference takes place, the duration of the grant is limited to a shorter period than it would have been, had no counter claim been set up. In all these countries, a laudable anxiety is exhibited by the legislature to promote the interests of the States, by encouraging the introduction of new inventions;

and one indispensable condition for the maintenance of the patent is, that the inventor or introducer shall instruct certain of the inhabitants in the improvements which he is desirous of carrying out, in order that they may, when the grant is expired, avail themselves of the benefits to be derived from the invention. The following are the documents referred to :—

(Extracted from the Gazette of New Granada, dated at Bogota, June 20th, 1841.*)*

DECREE,

GRANTING AN EXCLUSIVE PRIVILEGE TO ALONZO GONZALEZ, FOR AN IMPROVED MANUFACTURE OF WOOLLEN CLOTHS.

The Senate and Chamber of Representatives of New Granada, assembled in Congress :

On considering the petition of Alonzo Gonzalez, soliciting from the Government an exclusive privilege for the manufacture and sale of woollen cloths, prepared with machinery of his invention, and exercising the 15th function conferred upon Congress by the 74th Article of the Constitution, Decree :—

Art. 1.—There is granted to Alonzo Gonzalez an exclusive privilege, for the term of twenty-five years,—

1st.—To introduce and establish in the Republic the machinery of his invention for his improved method of manufacturing woollen cloths, the drawings and description of which have accompanied his petition.

2ndly.—To use, in the manufacture of the said woollen cloths, all the improvements, additions, or alterations which he may hereafter introduce therein ; and,

3rdly.—To manufacture in the Republic woollen cloths by his method, for which the privilege is granted.

Art. 2.—In order that the privileged party may enjoy the privilege granted to him by the preceding Article, he must establish in the territory of the Republic one or more factories for the manufacture of the said woollen cloths, at farthest within four years, reckoning from the date of the sanction of this Decree.

Art. 3.—As soon as the privileged party shall have erected in the territory of the Republic a factory of said woollen cloths, and made a commencement with the manufacture, he shall inform the Executive Government thereof ; and the latter, on causing the establishment to be inspected, and finding it in a condition to produce cloths of the quality of any one of the patterns accompanying the petition, or of any better, shall declare the privileged party to be in possession of the privilege ; and from that date the term specified in Article 1, shall be reckoned.

Art. 4.—After the expiration of six months, reckoned from the declaration, of which mention is made in the foregoing Article, no company, nor individual, including the said privileged party, shall be allowed to introduce woollen cloths, made in this manner, into the Republic. This prohibition shall be in force for the term of ten years, and the woollen cloths which may be imported in contravention or opposition thereof, shall be confiscated.

Art. 5.—If, after the declaration of the privilege, in conformity with Article 3, the manufacture of the cloths should be suspended for more than one year, the privilege shall cease.

Art. 6.—No kind of national duties shall be paid for the machines, implements, and fittings which may be imported for the erection of the aforesaid cloth factories.

Art. 7.—Alonzo Gonzalez may transfer or alienate the said privilege; and any person, who, by succession, transfer, alienation, or any other cause, may represent his rights, shall enjoy the concessions granted by this Decree, and shall be subject to the conditions stipulated therein.

Art. 8.—In each of the provinces where the privileged party may establish his factories, he shall be bound to admit, gratuitously, six youths of Granada, in order that they may learn the processes observed and carried on in the same.

Art. 9.—This privilege may be prolonged by the Congress after the establishment of the cloth factories, if the privileged party shall petition to that effect, and if it shall be conducive to the interests of the Republic, and the subsistence of the undertaking.

Given at Bogota, the 28th May, 1841.

The President of the Senate,	Antonia Malo.
The Vice-president of the Chamber of Representatives,	Jorje Juan Hoyos.
The Senator Secretary,	Jose M. Saiz.
The Deputy Secretary of the Chamber of Representatives,	Pastor Ospina.

Bogota, 5th June, 1841. Let the same be executed and published.

P. A. Herran.

For His Excellency the President of the Republic,
The Secretary of State of the Department of Finance.
Mariano Calvo.

REPUBLIC OF CHILI.

(Copy.)

Whereas Thomas Robinson, a resident citizen of London, has applied, through the medium of Don Jorge Huncas, to solicit an exclusive privilege to establish in this country an invention of improvements in the manufacture of silk, cotton, linen, and woollen fabrics; and there having been appointed as examiners Don Pedro Nolasco Mena, and Don Santiago Ingram, who, after having made oath well and truly to discharge the commission confided to them, and after having examined the patterns or samples, and the drawings and description of the machinery, have concluded by reporting and certifying to the Government the originality of the invention, and, at the same time, the utility of the introduction of the said manufacture into the country; and the interested party having complied with the enactments of the Law of the 9th of September, of the foregoing year, by depositing in the National Museum the patterns or samples, with the drawings of the machines, and a paper containing an explanation or description of the mechanism and processes; and having paid in fifty dollars to the General Treasury; I, the President of the Republic, &c., have proceeded to grant to the said Thomas Robinson an exclusive privilege, in Chili, for the term of eight years, which shall commence to be reckoned from the 1st of May, 1843, for the improved method of manufacturing silk, cotton, linen, and woollen fabrics, which he has shewn to be of his own invention, allowing him the two years which intervene between the present and that date, as the period necessary for establishing the said manufacture in any part of the territory of the Republic.

Given in the Hall of the Government at Saint Jago, signed with my hand, sealed with the Seal of the Republic, and countersigned by the Minister the Secretary of the Cabinet in the Department of the Interior, this 24th of May, in the year 1841.

JOAQUIM PRIETO.
RAMON LUIS YRARRAZAVAL.

Extracted from the Gazette of Peru, called El Peruano, No. 28. *Lima, Saturday, October 2nd,* 1841.—*Official Articles.*

IN the matter of the petition of Senor Tomaso Guglielmo, for the grant to him of an exclusive privilege for working an invention of improvements in the manufacture of woollen cloths; and also of the petition presented by Don Rufino Guido, in which the same privilege is solicited, and moreover that of manufacturing silk goods, cotton, linen, hempen, and fur wares; and, considering that the petition of Tomaso Guglielmo is accompanied with all the requisite conditions, which assure not only the novelty of the invention, but also the actual manufacture of the cloths within the territory of the State, and which is not ensured by the petition and application of Don Rufino Guido, let the patent sued for by Tomaso Guglielmo be issued under the following conditions:—

The duration of the privilege shall be for fifteen years, to be reckoned from the time when a factory shall have been established, and put into productive operation.

Within two years, reckoned from the date of this decree, one factory, at least, must be established, and in operation, otherwise this privilege shall be of none effect.

Within the term of one year, reckoned from the date hereof, the said Tomaso Guglielmo is to give notice as to whether he agrees to these conditions, and within that term the importation of the said woollen cloths shall be allowed.

The fourth part, at least, of the workmen whom he may employ in the manufactory or factories that he may establish, must be natives of the country.

He shall also admit children of the country to be instructed in the method of manufacturing the said cloths.

This privilege is to be understood as granted to the said Tomaso Guglielmo, his successors, deputies, and representatives, and he may alienate the same, wholly or in part, to one or many persons, all of whom shall enjoy the same, and be subject to the conditions above mentioned.

This privilege is granted without prejudice of a third party.

A like favour shall be granted to Don Rufino Guido, in reference to the manufacture of fabrics of silk, cotton, linen, and hempen and fur goods, provided that he, or his representatives, manufacture the same in the territory of the Republic, and submit to perform the same in the manner, and within the terms according to which the exclusive manufacture of woollen cloths is granted to the said Tomaso Guglielmo by this decree.

Let these presents be notified and published.

(Signature of his Excellency.) TUDELA.

Lima, September 22nd, 1841.

Scientific Notices.

CHEMISTRY SIMPLIFIED;

IN ITS APPLICATION TO THE TESTING OF ALKALIS, ACIDS, AND BLEACHING SUBSTANCES:

Being a Lecture delivered by Andrew Ure, M.D., F.R.S., &c. to the Pharmaceutical Society.

I.—ALKALIMETRY.

TWENTY-EIGHT years have elapsed since I was led by peculiar circumstances to construct a very simple method of testing alkalis, the principle of which I soon afterwards applied to acids, bleaching powder, dye stuffs, and most other chemical substances extensively used in manufactures.* In 1814 and 1815, during the summer vacation of my Glasgow classes, I was engaged in delivering courses of lectures on chemistry in the Belfast Academical Institution, and had many of the most eminent members of the Linen Board of that town for my pupils. Being occasionally consulted upon the qualities of the alkalis, which were used to the value of £200,000 by the linen bleachers of Ireland, I saw the importance to them of a simple alkalimetrical test, both for purchasing and for using their barillas and potashes. The following extract from the *Belfast News Letter*, of July 9th, 1816, will show the nature of my contrivance:

> "This day one of the porters of the Linen Hall, Belfast, was called into the library-room at the request of Dr. Ure, who, being quite unknown to Dr. Ure, and never having seen any experiments made with acids and alkalis, he took the instrument at our desire, which being filled with coloured acid, by pouring it slowly on adulterated alkali, which we had previously prepared, he ascertained exactly the per-centage of genuine alkali in the mixture. Belfast, 25th June, 1816.
>
> "(Signed) JOHN S. FERGUSON, *Chairman.*
> JAMES M'DONNEL, M.D.
> JOHN M. STOUPE.
> S. THOMSON, M.D."

Of these gentlemen, two were leading members of the Linen Board, and the others the two principal physicians of the town. The publication of the details of my method of alkalimetry was delayed till arrangements were made for its general introduction, under the direction of the Linen Board of Dublin, whose Professor of Chemistry, Mr. W. Higgins, as well as Dr. Barker, Professor of Chemistry in Trinity College, granted certificates of the "accuracy and the national importance" of the instrument. The alkaline matter then imported into Ireland was often largely contaminated with common salt, even to the extent of 80 or 90 per cent. During the procrastination of the Board, I lent my Treatise on Alkalimetry to Dr. Henry, of Manchester, who inadvertently published an account of it, though with reference to me, in the next edition of his *Elements of Chemistry*. Having, in the long interval since, contrived many modifications of the instrument, and having extended its principle to testing other articles, I am induced to offer it now to the world, in consequence of the recent appearance of a publication upon the same subject, by two very ingenious chemists of Liebig's school, Drs. R. Fresenius and H. Will. Of their system of alkalimetry, &c. a copious abstract appeared in the *Annalen der Chemie und Pharmacie*, for July last; and about the same time a pamphlet was published by Winter, at Heidelberg, under the title *Neue Verfahrungsweisen*

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* Among others to nitrate of potash, nitrate of soda, and to white lead, either in powder or in paint. My nitrometer enables a person not at all versant in chemistry to ascertain in a quarter of an hour, but by two distinct processes, the quantity of pure nitrate, in either of these salts, to one part in 200. The cerussa-meter is equally simple and expeditious.

zur Bestimmung des Werthes der Pottasche und Soda, der Saüren, und des Braunstein; or, "New Processes for determining the Value of Potash and Soda, of Acids, and Black Oxide of Manganese." However accurate these processes may be, and however apt for a German or French student of Chemistry, they are, in my apprehension, not at all fitted for the familiar use of manufacturers and dealers in any country, and certainly not for those of the United Kingdom.

Descroizilles was the first person who contrived an instrument, called an Alkalimeter, to ascertain the alkaline strength of potash and soda, without much calculation. His method was described in the *Annales de Chimie* for 1806, tom. lx., and a translation of it appeared in our *Philosophical Magazine*, vol. xxviii., for July and August of the following year. His apparatus consisted of a glass tube, eight or nine inches long, and seven or eight lines in diameter, closed at one end, but terminated at the other in a kind of small funnel (with a beak or spout), connected to the tube by a narrow neck, having a calibre of two lines and a half. Upon the shoulder, under the throat, there was a hole for admitting air to the long tube in the act of being emptied, by sloping its mouth downwards. This cylindrical vessel was to contain thirty-eight grammes of water, which space was divided into seventy-six equal parts, which it was extremely important to proportion accurately. The liquor was prepared by taking concentrated sulphuric acid, at 66° Baumé (1·845 spec. grav.), and diluting it with nine times its weight of water. The instrument being poised in a balance, he introduced into it very exactly two grammes of the above test acid, and when the instrument stood upright, he scratched a line at the level of the liquor, and thus proceeded by addition of successive grammes to graduate the whole, till thirty-six were added, after which he subdivided these spaces by lines into seventy-two demi-gramme volumes. He then proceeds to describe eight different subsidiary articles required for his operations:

"*Alkalimetrical trials of potash.*—Weigh exactly one decigramme of potash, put it into a glass, and pour upon it about four-fifths of a decilitre of water; facilitate the solution of the potash by stirring it with a small chip of wood, three or four times in an hour and a half, a minute at each time. When the solution is effected, pour it into the small tin measure, No. 4, which is to be then filled up with water; pour it back again into the glass, in which you must still pour a measure full of pure water; stir this new mixture also three or four times within half an hour, in order to facilitate the precipitation of a slight sediment, which soon falls down. This sediment being completely formed, slope the glass with caution, in order to fill with clear liquor the small measure; then empty this last into another large glass; after this, place round the edges of a plate drops of syrup of violets; pour also into the alkalimeter test liquor, until the line marks

0; take it afterwards with the left hand, inclining it upon the glass which contains the moiety of the clean alkaline solution: the acid liquor will fall into it by hasty drops, or in a very small thread, which you may moderate at pleasure, by retarding the entrance of the air at the lateral hole or vent, upon which must be placed the end of the finger; at the same time, with a small stick or match, assist the mixture and facilitate the developement of the carbonic acid, which is manifested by effervescence. When you have emptied the alkalimeter to about the line 40, try if the saturation approaches, by drawing your small stick from the mixture, and resting it upon the drops of syrup of violets, which should become green, if the potash is not of a very inferior quality. If, on the contrary, the violet color is not altered, or what would be worse, if it be changed into red, there would be, in the first case, an indication of saturation, and in the second a proof of super-saturation. But this is not the case with good potashes: at that line, the liquor tried can alter the syrup of violets into green only; or cause to return to the violet, and even to the green, the drops which had been changed into red at the time of a former trial; we must, therefore, in general add more acid, which occasions a new effervescence. This addition must always be made with caution, and we must touch every time a drop of syrup of violets in order to stop. When at last the latter assumes a red hue, then, after having restored the alkalimeter to a perpendicular position, in order to see at what line the testing-liquor stops, you must reckon one degree less, in order to compensate the excess of saturation. The mean term of potashes is 56; this implies that they require for their saturation *fifty-five hundredths* of their weight of sulphuric acid."

For the analysis of commercial sodas of all kinds, M. Descroizilles prescribes using ten and a half deci-grammes of this alkali, instead of the ten deci-grammes for potashes, and proceeds as above detailed. In his table of results annexed, we find American potashes called 60° to 63°.

American pearl ashes ……	50	to 55
Dantzic potash…………	45	to 55
Alicant soda……………	20	to 33

It is obvious, from these statements, that the alkalimeter so made and graduated denoted comparative, but not absolute, quantities of alkalies present in the commercial samples. The rest of his very long memoir is occupied with what he calls the graduation of potashes and sodas, the economy of their graduation, the proportions of carbonic acid in them, the processes of caustification, the presence of potash in all lime which is burnt by a wood fire, origin of neutral soda, and probable origin of natrum; without any more explicit instructions. The instrument, as left in this vague state, never was employed, nor could it come into use, among English manufacturers and dealers.

The next alkalimeter, of which an account has been published, was my own. In constructing this instrument, I availed myself of the lights recently shed on chemical proportions by Dr. Dalton's atomic theory, and I thus made it to represent, not relative, but absolute measures of the amount of real alkali existing in any commercial sample. The test-liquor used at that time was sulphuric acid, which is most readily and accurately diluted to the requisite degree by means of a glass bead, very carefully made, of the specific gravity that the standard acid should have. In order to make the test-liquor, therefore, nothing more is requisite than to put the bead into distilled water, and to add to it somewhat dilute but pure sulphuric acid, slowly and with agitation, till the bead rises from the bottom, and floats in the middle of the liquor at the temperature of 60° Fahr. The delicacy of this means of adjustment is so great, that a single degree of increase of heat will cause the bead to sink to the bottom—a precision which no hydrometer can rival. The test-tube, about 14 inches long, contains generally 1000 grains of water, and is graduated into 100 equal parts by means of equal measures of mercury. The test-liquor is faintly tinged with red-cabbage or litmus; so that the change of color, as it approaches to the saturating pitch, on adding it to 100 grains of the commercial alkali, becomes a sure guide in conducting the experiment to a successful issue. One hundred measures of this test-liquor neutralize exactly 100 grains of absolute soda (oxide of sodium), and of course very nearly 150 of potash. A bead may also be adjusted for test-liquors, of which 1000 grain measures neutralize 100 of potash, and therefore 66⅔ of soda, as well as other proportions, for special purposes of greater minuteness of research. One may be so graduated as to indicate clearly a difference of one-hundredth of a grain of ammonia. In making such nice experiments it is, of course, requisite to free the alkaline matter beforehand from sulphurets, sulphites, and hyposulphites, by igniting it in contact with chlorate of potash, as long since recommended by Guy Lussac. With such means in careful hands, all the problems of alkalimetry may be accurately solved by an ordinary operator.

On the same principle, my *Acidimeter* is constructed; pure water of ammonia is made of such a standard strength by an adjusted glass bead, as that 1000 grain measures of it neutralize exactly a quantity of any one real acid, denoted by its atomic weight upon either the hydrogen or oxygen scale or radix; as for example, 40 grains of sulphuric acid. Hence it becomes a universal acidimeter; after the neutralization of 10 or 100 grains of any acid, as denoted by the well-defined color in the litmus-tinted ammonia, the test-tube measures of ammonia expended being multiplied by the atomic weight of the acid, the product denotes the quantity of it present in 10 or 100 grains. The proportion of any one free acid in any substance may thus be determined with precision, or to one-fiftieth of a grain, in the course of five minutes. Like methods are applied to Chlorometry, and other analytical purposes, with equal facility; adapting the test-liquor to the particular object in view. Instead of using beads for preparing the alkalimetric and acidimetric test-liquors, specific gravity bottles or hydrometers, may of course be employed; but they furnish incomparably more tedious, and less delicate means of adjustment. To adapt the above methods to the French weights and measures, now used generally also by the German chemists, we need only substitute 100 *deci-grammes* for 100 grains, and proceed in the graduation, &c. as already described.

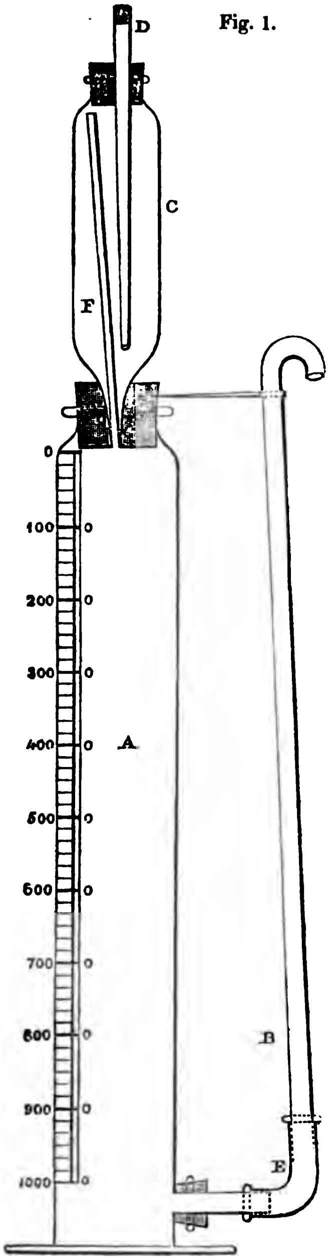
The possession of two reciprocal test-liquids affords ready and rigid means of verification. For microscopic analyses of alkaline and acid matter, a graduated tube of small bore, mounted in a frame with a valve apparatus at top, so as to let fall drops of any size, and at any interval, is desirable; and such I have employed for many years. Of this kind is my ammonia-meter, used in the ultimate analysis of guanos and other azotized products, in conjunction with a modified apparatus on the principle of that of Varrentrapp and Will. It may be remarked, that when the crude alkali contains some hyposulphite, it should not be calcined with chlorate of potash, because one atom of hyposulphurous acid is thereby converted into two atoms of sulphuric, which of course saturate double the quantity of alkali, previously in combination with the hyposulphurous acid. In such cases it is preferable to change the condition of the sulphurets, sulphites, and hyposulphites, by adding a little neutral chromate of potash to the alkaline solution, whence result, sulphate of chromium, water, and sulphur, three bodies, which will not affect the accuracy of the above alkalimetrical process.

In the *Annals of Philosophy* for October, 1817, I described a new instrument for analyzing the earthy and alkaline carbonates, and for determining the quantity of base present in them from the volume of carbonic acid, disengaged by their solution in acids, upon the data of the atomic theory. This method was applied to the analysis of the carbonates of ammonia, soda, potash, lime, magnesian limestone (dolomite), &c.

> "The indications of the above analytical instrument are so minute as to enable us, by the help of the old and well-known theorem for computing the proportions of two metals from the specific gravity of an alloy, to deduce the proportions of the bases from the volume of gas disengaged by a given weight of a mixed carbonate."—*Dictionary of Chemistry*, 1821.

That small instrument consisted of a bent glass tube, open at one end, and terminated at the other with an egg-shaped bulb from two to three inches in diameter, and it required for operating with it, about five pounds of quicksilver. The following glass

Fig. 1.



apparatus (fig. 1.) will be found more generally convenient, and equally exact. *A* is a cylinder 2¼ inches in diameter, and 14 inches long. It contains 10,000 grains of water in the graduated portion; 0, or zero, being at the top. It has a tubulure in the side close to the bottom, through the cork of which a short tube passes tight, and is connected to a collar of caoutchouc, *E*, which serves for a joint to the upright tube, *B*, resting near its open upper end in a hooked wire. Through the cork in the *mouth* of the cylinder, the taper tail of the flask *C*, passes air-tight. The small tube *F*, open at both ends, is cemented at bottom into the tail of *C*, and rises to the shoulder of the flask. The cork of *C*, is perforated, and receives air-tight the taper tube *D*, which can also be closed with a cork.

In operating with this apparatus, proceed as follows:—

Fill the cylinder with water, and cover its surface with half an inch of oil. Insert the tail of the flask. Put into the flask *C*, 58·6 grains of carbonate of potash, or 45·2 of carbonate of soda, according as common pearl-ash or soda-ash is to be tested, along with as much water as will cover fully the lower end of *D*, and then introduce this tube. Have a bottle containing about 40 parts of oil of vitriol, previously mixed with 60 of water, and cooled. Take of this, in a pouring or dropping glass, 100 water grain measures, and drop this quantity gradually through the tube *D*. The carbonic acid gas forthwith disengaged, will depress the water in *A*, cause an overflow of it from the tube *B*, which being held in the left hand, must have its swanbeak placed over a basin, and progressively lowered to the level of the descending water in the cylinder. When all the sulphuric acid has been introduced by the right hand, the orifice of *D* is to be corked, and the tube *B* continually lowered with the left, till the effervescence being finished, the water in *A* remains stationary. The number of the centigrade scale, opposite to the surface of the oil, deducting 100 grain measures for the bulk of dilute acid added, denotes the per-centage of pure carbonate of potash, or of soda, in the sample under examination. The above prescribed weights of these two carbonates, when pure, disengage each by the action of sulphuric acid (used here in small excess) 10,000 water grain measures of carbonic acid gas, or 100 measures of the scale on *A*. The cylinder which I employ, contains about 12,000 water grain measures, so that the bottom of the centigrade scale is fully two inches above the level of the lower tubulure. This capacity, and the graduation into 120 parts, will be found convenient in certain cases, particularly in analyzing bicarbonates of potash and soda.*

We may estimate 10,000 water grain measures of carbonic acid at 60° Fah., to weigh 18·4 grains, and we thus perceive what a magnified scale we should possess, if we applied the *vernier* contrivance here, as we do to barometers. At any rate, he must be an awkward operator who cannot determine the value of an alkaline carbonate, by the above means, to one part in a thousand.

In operating upon limestones, marls, &c., 42·1 grains should be taken as the standard weight of essay, because that weight of pure carbonate of lime should give out on solution in dilute muriatic acid, 10,000 water grain measures of carbonic acid gas. Since 100 water grain measures of liquid hydrochloric acid, specific gravity 1·14, will supersaturate the lime in the above weight of carbonates, that quantity may be used in the experiment. The preceding instrument will be found more convenient in experimenting, as also the system of indication, than one on similar principles constructed by the ingenious Dr. Mohr, of Coblenz.

In examining bicarbonates of potash and of soda, the weights to be used in the above apparatus, are 42 grains of the former, and 35¼ grains of the latter, each of which quantities, if the salts be perfect, will disengage 10,000 water grain measures of carbonic acid gas, by the action of sulphuric acid. There will be no harm in taking the formerly prescribed measure of the sulphuric acid, though considerably less would answer the purpose. The centigrade measures of gas obtained in *A*, will indicate the carbonated state of the two alkalies respectively. Their alkaline force may be most readily ascertained by my old alkalimeter, with colored test acid. Since the bicarbonates usually sold in our shops, especially that of soda, are far from being exact atomic compounds, they should be always examined, both for their base and acid, which may also be well done in the following way, where the quantity of carbonic acid gas is determined by weight instead of by volume.

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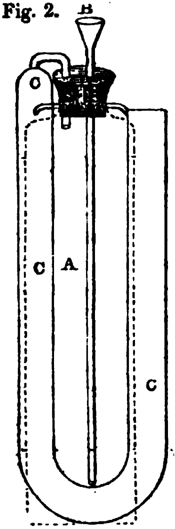
* For the greatest precision hot acid may be used in the above experiment, by taking in a graduated test tube seventy-five grains of water, and filling it up to the line 100 with concentrated sulphuric acid. This mixture being poured in successive portions into the flask *C* (represented much too large in proportion to the cylinder *A*), will ensure the expulsion of all the carbonic acid from *C*, which may be afterwards cooled by wrapping round it a towel dipped in cold water.

Fig. 2.

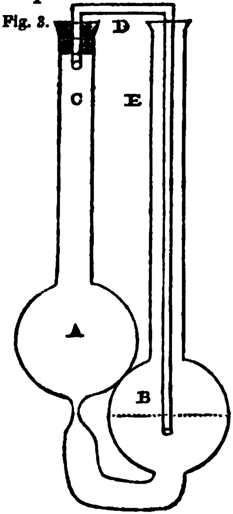


For this purpose, a small compact apparatus of the annexed form, fig. 2, will be found convenient; it is to be used in conjunction with my alkalimeter. *A* in the dotted line is the phial for receiving the carbonate to be tested; *B* the funnel into which the test acid is to be poured; *C C*, an inverted syphon filled with pieces of chloride of calcium, for absorbing the aqueous vapours exhaled by the carbonic acid. The loss of weight in the phial above that in the tube of test acid, shews the quantity of acid gas, and the indication of the alkalimeter tube, that of alkaline base, from which data the proportion of neutral carbonate and bicarbonate may be immediately deduced. Thus, 100 grains of bicarbonate of soda should give out 51¾ grains of carbonic acid, and saturate 37·6 centigrade measures of the test acid, equivalent to 37·6 grains of real soda. But if neutral carbonate of soda be present, less gas will be given out, and more or less alkali may be indicated, according to the degree of dryness of the neutral soda. The amount of water in the bicarbonate may be determined by igniting 20 grains in a test tube, connected with the chlorcalcium inverted syphon; 10⅓ grains of carbonic acid gas should be expelled, and 2⅓ of water, making a total loss of 12½¼ grains, of which 2⅓ will be found as water absorbed by the chlorcalcium. But since a very moderate heat suffices to expel the second atom of carbonic acid from the bicarbonate of soda, the readiest mode of estimating its quality is to heat, over a spirit lamp, in a small flask or retort, connected air-tight by a tube with the mouth of the cylinder *A*, fig. 1, 70¾ grains of the supposed bicarbonate. Of the perfect salt this quantity should give out pretty exactly 10,000 grain measures of gas; and whatever aliquot part of this volume is evolved will indicate, without calculation, the relative value of the substance as a bisalt. Thus, if

8500 grain measures of gas are obtained, 85 parts of bicarbonate of soda are present in 100. The crystalline form of bicarbonate of potash is a tolerably good criterion of its quality.

The quantity of caustic alkali mixed with carbonate may be readily determined, with sufficient accuracy, by the expert use of my alkalimeter; because, till the caustic portion be nearly neutralized, little or no carbonic gas is expelled. When the effervescence at length begins, the test measures already expended denote the per-centage of caustic alkali. It is not right to disregard the alkali which is present in the state of sulphuret, because, as such, it is effective in many processes of the chemical arts; in the manufacture of yellow soap, crown glass, in the bleaching of linen and cotton goods, &c. The alkalimeter, directly applied, will show the alkali present in this form, when compared with that indicated after ignition of the crude alkali with chlorate of potash, or after its treatment with yellow chromate of potash.*

Fig. 3.



A few years ago, I had the following apparatus made for the ready analysis of carbonates, by ascertaining the loss of weight they suffered from the disengagement of their carbonic acid gas, during their solution in an acid. *A*, *B*, are two globes, of about two inches in diameter each; *A* has its inferior neck strangled into a bore nearly capillary; *B* stands lower, with its centre line on a level with the narrow neck of *B*. The tubes of these globes are about one-half inch in diameter. *C* is shut at top with a perforated cork, through which enters, air-tight, a small glass tube, which is bent across to the mouth of the tube *E*, and then passes down into it a little below the centre line of the globe *B*. This globe is rather more than half filled with sulphuric acid, when the instrument is employed in the analysis of the carbonates. The standard weight of carbonate of soda $=24\frac{1}{3}$ grains, or of carbonate of potash$=31\frac{1}{3}$ grains, is then put into *A*, having previously laid a minute globe of glass over the lower orifice; the cork, with its small tube, is now firmly adjusted; and the apparatus is weighed in its upright position, either by suspension with a hook to the end of the beam, or by resting it on the scale in a light socket of any kind. It is next laid hold of, and inclined so as to cause a little of the acid in *B* to pass over into *A*. Effervescence ensues with greater or less vehemence, according to the nature of the carbonate and quantity of the acid introduced. Should it be too violent, and threaten an overflow by intumescence, it can be instantly abated to any degree by the slightest slope of the instrument. Now, this power of control forms the peculiar feature and advantage of this contrivance; whereas, in all other forms of such apparatus that I know, whether by sucking over or pouring in, if a little too much acid comes upon the carbonate, the experiment is effectually marred. The gas disengaged in *A* must necessarily traverse the sulphuric acid in *B*, and be stripped of its moisture before escaping into the air. Having supersaturated the alkaline base, and cooled the apparatus, we weigh it again, and the loss of weight in grains and tenths denotes the per-centage of soda or potash, provided their neutral carbonates had been the subjects of experiment. For limestone, on the same plan of computation, 22¾ grains may be taken. It deserves to be noted, that the present instrument has only one junction, and needs no chloride of calcium, a substance so apt by its swelling to burst the glass tubes that contain it.*

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* If the alkaline carbonate contains sulphuret, sulphite, or hyposulphite, a teaspoonful of yellow chromate of potash may be added to it, wherefrom result sulphate of chromium, water, and sulphur, which remain in the apparatus without affecting its weight. The mutual action of neutral chromate of potash, and of sulphuret of potash, &c., has been discussed in an ingenious paper published by Dopping, in the *Annalen der Chemie* for May, 1843, p. 172.

[*To be continued.*]

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 213, Vol. XXIV.)

"Description of a wrought-iron Lattice Bridge, lately erected on the line of the Dublin and Drogheda Railway." By G. W. Hemans, Grad. Inst. C. E.

This kind of bridge is stated to have been first used in America, where, timber being so abundant, the lattice sides are formed of that material, and consist simply of planks three inches thick, crossed so as to form deep beams, secured with oak trenails at all the intersections.

The bridge described in this communication is situated about three miles from Dublin, over an excavation of 36 feet in depth;

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* 1000 water-grain measures of sulphuric acid of specific gravity 1·032, or 32 above water, neutralize 32 grains of soda, and, consequently, one atom, on the hydrogen scale, of each of the other bases, reckoned in grains.

Having in the course of many years subjected my tables of sulphuric, nitric, and muriatic acids, as well as of ammonia, to strict cross-examination, I have found them trustworthy for all alkalimetrical and acidimetrical purposes.

its span is 84 feet in the clear, and the two lattice beams are set on edge parallel to each other, resting at either end on plain stone abutments built in the slope. These beams are 10 feet in depth, and are formed by a series of flat bars of wrought-iron, 2½ inches wide, and ⅜ inch thick, crossing each other at an angle of 45°. At a height of 5 feet 6 inches above the bottom edge, transverse bearers are placed, formed of ¼ inch angle-iron, 6 inches deep, and set 2 feet apart, similar to the cross ties now used for the decks of iron steam vessels, and upon these the planking for the roadway is fastened.

The account of the mode of construction, and of the raising and fixing the lattice-beams, by Messrs. Perry, of Dublin, the contractors, is given in detail.

The author states, that some deflection or sagging of the lattices was expected, and was provided for by constructing each of them with a camber or gradual curve from the ends, amounting to 12 inches in the centre, but that far from such being the case, they did not sink even when heavy weights passed over them.

The total cost of the bridge, including the masonry of the abutments, was £510.

The paper is illustrated by a drawing, showing the elevation and the details of the construction of the bridge.

Major-General Pasley had seen and approved the bridge; it appeared to be on a good principle, and was well constructed. He understood that it had been Mr. Macneil's intention to have a model made of a viaduct of 230 feet in length, with a central span of 140 feet, which he had designed for carrying the Dublin and Drogheda Railway across the Royal Canal in an oblique direction, but he now considered that the bridge which had been described was better than a model; and as it had borne, with only a slight deflection, a loaded waggon weighing 22 tons, and all other tests to which it had been submitted, he had decided upon building the larger bridge upon the same principle.

Captain Moorsom thought that the bridge was too expensive, and that if the lattice sides had been 8 feet 6 inches in depth, they would have been quite strong enough. In the timber bridges of the same construction in America, any tendency to either flexibility or buckling was obviated by placing several ranges of lattices side by side, and the custom of roofing the timber bridges of that country, also gave additional strength laterally. The timber bridges on this principle which he had constructed on the Birmingham and Gloucester Railway (one of which was 100 feet span, and others between 90 and 120 feet span), varied in cost from £4 to nearly £6 per running foot, according to the span, the larger spans being proportionally less expensive than the smaller. Materials and labour were dear at the time of constructing the bridges alluded to.

The President hoped that the good example set by Mr. Hemans in sending this account of a portion of the work committed to his charge, would have the effect of inducing other graduates to send to the Institution papers which he was sure would prove advantageous to them, in causing their talents to become better known among the members of the profession.

Mr. Manby presented a drawing of Macdonald's improved railway, which was patented in 1832. It consisted of a peculiar mode of arranging ribs of metal so as respectively to support the pressure and tension: it was intended thus to form a series of beams supported by pillars or piers, upon which the railway was proposed to be laid.*

Mr. Manby presented a drawing made by him from the designs of Mr. Lemuel Wright, for a bridge on this principle, of 560 feet span with a versed sine of 15 feet, which was proposed to have been erected over the Medway at Rochester.

February 6, 1844.

The President in the Chair.

"Description of a Water-wheel constructed by Mr. W. Fairbairn, M. Inst. C. E., and erected in Lombardy." By Shute Barrington Moody, Grad. Inst. C. E.

The chief peculiarities of this wheel, are stated to consist in the introduction of the tension principle for the arms, and the ventilating system for the buckets.

The use of wrought-iron bars for the arms and braces, materially diminishes the weight, as, owing to their superior strength in resisting shocks, fewer centres and arms are required, and consequently a lighter shaft can be used. The repairs are also less frequent, and are not so expensive as in wheels with cast-iron arms.

The advantage of the ventilating system is, that all the water, which, in the ordinary construction, would splash with the air from the bucket and be lost in the race, is conducted by an inner sheathing or sole plate, into the lower buckets, while the air is enabled to pass off freely, behind this inner sheathing; the effective power of the wheel is thus increased, and its action is stated to be very satisfactory. The average speed is 5.25 feet per second, and the buckets are generally about two-thirds filled.

The communication is accompanied by a drawing, showing the elevation and section of the wheel.

Mr. Albano stated, that having been called to Lombardy in the year 1840, for the purpose of erecting a mill for spinning and weaving flax, he selected a spot at Cassano d'Adda, where he found a stream of water, which at that time could only drive two pair of corn-mill stones, and two saw frames, each containing two large perpendicular saws. He conceived that this power might be employed more advantageously by improving the water-course, and had succeeded eventually in enabling it to give motion to upwards of six thousand spindles, and a number of power looms. For this purpose he designed the general plan of the mill, and the water-wheel which had been described, and had intrusted its execution, with other parts of the millwright work, to Mr. Fairbairn, adopting, at his suggestion, the ventilating principle for the buckets, which had proved very advantageous. In the ordinary form of buckets, the air, not being able to escape, prevented them from being filled, and thus the power of the wheel was diminished. For the purpose of avoiding that loss of power, Mr. Albano had originally designed the top of the feeding cistern to be cast of an open pattern, so as to allow the air to pass away freely, but that plan had been partially superseded by the ventilation of the buckets.

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* Vide "Newton's London Journal of Arts and Sciences," Vol. II. (Conjoined Series), p. 158.

The drawings did not show, what he considered an important improvement, in the method of governing the opening of the breast-shuttle. Mr. Fairbairn's usual plan was to have a shaft across the feeder, with a chain attached to the rack, and a heavy balance weight suspended from it over the water. Mr. Albano had modified this system by introducing gearing, and a second motion, with a supplementary shaft extended into a vault beneath the mill; a much smaller balance weight thus regulated the movement of the shuttle with great ease, and it was so delicately balanced, that on one set of spindles being stopped, it was immediately perceived from the action of this governor.

Mr. Fairbairn's usual practice was, to make the periphery of his wheels move at a velocity of from 4 feet to 5 feet per second for low falls; but Mr. Albano had increased the velocity of this wheel to 5·25 feet per second, which he found to be very advantageous, and more convenient for driving machinery, which was required to attain a very high velocity. He found the effective work of the wheel to be about 0·60 of the water expended.

Mr. Mallet had found that the co-efficient of the majority of the wheels constructed in this country, was between 5-10ths and 6-10ths.

Mr. Taylor said, that in the session of 1842, he had given a statement of the average performance of a number of wheels, employed in pumping from some mines in Devonshire, and it was found to be 63·3 per cent.

Mr. Glynn stated, that the general work of good overshot wheels, might be taken at 2-3rds of the water employed to turn them, supposing that the water was required to be raised again to its original level. This included the friction of the pumps, rods, &c.

"Description of a Water-Meter." By P. Carmichael, (Dundee.)

This meter is stated to have been used for some time, for the purpose of supplying the three steam boilers of an engine of 80 horse power, and by it, the evaporative powers of the boilers, which were of different forms, and the value of various kinds of fuel, have been carefully tested.

Its action is thus described; within a closed box which will contain 50 gallons of water, a copper float is placed, so as to move up and down freely, on a hollow spindle between two stops; by means of levers and a spanner, which are acted upon by the float, two conical valves are alternately opened and shut, as the box is required to be filled, or its contents to be allowed to pass to the boiler. The float ascends above the top, and descends below the bottom of the box, in cavities arranged for the purpose, by which means, only a given quantity of water is passed through the box at each descent of the float. It is found by practice, that each discharge contains exactly the same quantity of water.

The communication is illustrated by three detailed drawings shewing the construction of the machine.

Mr. Wertheimber exhibited several modifications of the "Automaton Calculator," invented by Dr. Roth, and exemplified their practical use, by performing, with great rapidity, calculations in all the simple arithmetical rules.

The machine for performing addition, multiplication, and subtraction, consists of a narrow oblong box, with a metal plate on the top, which is divided into nine indexes, and semicircular notches; the first six, from left to right, serve for the numbers, from hundred thousands to units; the three last are appropriated to shillings, pence, and farthings. Round each index are engraved figures, from 0 to 9, and the semicircular notches contain teeth, which correspond with the figures. Under each notch is a circular hole, and in these, the result of the calculation appears, at the end of the operation.

The mode of using the instrument is very simple; it is performed by inserting a metal point in the teeth of such figures in the indexes, as are required to be brought into action, and drawing each one down to 0; the result is then read off from the circular opening in which it appears recorded.

The machine for division, and for performing more complicated calculations, is circular and much more bulky.

Mr. Wertheimber showed the interior of the machine, and explained, that its action was produced by a simple combination of toothed wheels and springs, so contrived as to render an error in the result impossible.

He then gave a short historical sketch of the various attempts at constructing calculating machines, noticing;

First, the Abacus of the Romans, and the calculating boxes of the Chinese and the Russians.

Secondly, The calculating rods, two of which, being each divided into equal parts, from 0 to 100, were used for addition of two numbers, by placing the first number on one scale opposite 0 on the other, and opposite the second number would be the result of the calculation. The operation of subtraction was directly the reverse of that for addition. Several modifications of these scales were introduced by Perrault, in 1720; Poetius, in 1728; Perègre, in 1750: Prahl, in 1789; Grüson, in 1790; and Güble, in 1799.

Thirdly, The inventions of Napier, the "Virgulæ Napernianæ," the "Multiplicationis promptuarium," and the "Abacus Arcalis," in 1617; then the plans of Caspar Scott, in 1620; Demeam, in 1731; Lordan, in 1798; Leopold, Petit, and others.

Fourthly, The improvements in Gunter's scale by Wingate, in 1627, which were modified by Milburne into the present sliding rule, in 1650, and still further improved by Seth Partridge, in 1657.

These contrivances gave rise to the formation of the more important machines of Blaise Pascal, in 1640; Sir Samuel Moreland, in 1666; Lepin, in 1725; Hillorin, in 1730, and Gersten, in 1735; this latter was presented, like that of Leibnitz, to the Royal Society of London.

Several other attempts at calculating machines, most of which were failures, were then noticed, until 1821, when Mr. Babbage undertook his large machine, which he completed as far as forming a progression up to five figures.

Upon these examples Dr. Roth is stated to have worked, and the result is shewn in the simple instrument which he has produced, and which has been extensively used in public offices and banks, where it is found to be very useful.

It has also been adopted as a counter, or register of the number of strokes, or of rotations of machines, and answers very well for that purpose.

Mr. B. Albano exhibited a collection of specimens of a new material for architectural decoration, which was called the 'Cannabic' composition; its basis, he explained, was hemp, which, after being amalgamated with resinous substances, and undergoing careful preparation, was worked up into sheets of considerable dimensions. The ornaments were produced in very high relief, and with great sharpness in the details, by subjecting these sheets to compression between metal dies under powerful presses; they were thin, were less than half the weight of papier-maché ornaments, and possessed an amount of elasticity, which was advantageous in adapting them to the walls of houses; yet they were so hard as to bear the blow of a hammer, and resisted the action of heat and cold and of the weather, without change of form. The composition had even been used on the continent for covering roofs, and in those situations had remained uninjured.

The invention was of Italian origin, and had only recently been so extensively brought into use, as to justify its being introduced to the notice of the Institution.

Mr. Albano promised on a future occasion, to give a full account of the machinery used in the process, as soon as it should have been brought into active operation in this country: at present, the ornaments were imported from France, but even with that disadvantage, their price was from ten to twenty per cent. under that of any other material used for a similar purpose.

Mr. Ponsonby said that he had employed these ornaments very extensively for cornices, for panels, and centres of ceilings, for looking-glasses, picture frames, and numerous kinds of internal decorations; their surface was capable of being painted, bronzed or varnished, and they were, from their hardness, peculiarly adapted for being burnished when gilt, as was shown by the specimens on the table.

Scientific Adjudication.

COURT OF CHANCERY.

Before the Lord Chancellor.—July 28*th, Aug.* 1*st and* 2*nd,* 1843.

MUNTZ *v.* FOSTER AND OTHERS.

THE Solicitor-General, Mr. Follett, and Mr. Wigram appeared as counsel for the plaintiff, and Mr. Bethell, Mr. Russell, and Mr. Lloyd for the defendants.

This was an application, on the part of the defendants, to dissolve an injunction which had been granted by Vice-Chancellor Bruce (with directions for a trial in a court of law,) on the plea of restraining them from infringing a patent obtained by the plaintiff, October 22nd, 1832, for "an improved manufacture of metal plates for sheathing the bottoms of ships and other such vessels."

On the part of the defendants, it was stated, that the injunction had caused the stoppage of their manufactory, and thereby thrown between forty and fifty workmen out of employ; that its continuance would occasion almost irreparable mischief to the defendants; whereas, by dissolving it, and ordering an account to be kept, no injury would be done to Mr. Muntz; and, moreover, that the defendants had been using Collins' expired patent.

For the plaintiff, it was contended, that the injunction ought to be sustained, he having been in possession of his patent for more than eleven years, during which time it had been the invariable practice of the court, in similar cases, to grant injunctions until an action could be tried. It was also stated, that there was no proof of Collins' invention having ever been in general use.

The Lord Chancellor said he must read the affidavits before giving judgment.

JUDGMENT.

November 8*th.*—His Lordship now delivered judgment in the following terms:—I have read the affidavits carefully, and the proceedings in this case. The object of Mr. Muntz's invention is to produce, by a combination of copper and zinc, an alloy that would oxidate less than copper, but at the same time sufficiently to keep the vessel clean, and possessing a degree of ductility necessary for the purpose of sheathing: such a sheathing would be cheaper and more durable than the copper sheathings in ordinary use. This object, as was found by experiments, could only be effected by copper and zinc of the purest quality, or, as he describes it, of the quality known by the name of "best selected copper," and zinc of the quality distinguished as "foreign zinc." These qualities appear to be essential to the success of his invention. The process would be defeated by the mixture, except in very minute quantities, of foreign ingredients. I think these facts are sufficiently established by the evidence. But it is contended that the invention is not new, and that the patent is therefore invalid; and reference is made, for the purpose of establishing this case, to a patent obtained by one Collins, as far back as the year 1800, the object of which was, among other things, to manufacture sheathing of a mixture of copper and zinc; but, although this patent was obtained upwards of forty years ago, it does not appear that the article was ever introduced into use, or a single sheet of sheathing ever manufactured under it. If it ever attracted public notice, it appears to have been long since forgotten. I am satisfied, on the evidence, that it was unknown to Mr. Muntz at the time when he obtained his patent; and I am further satisfied, the object would not have been accomplished by ordinary copper and zinc united, according to Collins' process; that any attempt made to effect this must have failed, which may well account for no public use having been made, during so long a period, of this patent. It was said, indeed, by the defendants, that the sheathing manufactured by them was made according to Collins' specification; but this sheathing appears to have been subjected to a strict analysis, and it turns out to be composed of the purest copper and the purest zinc, in the same proportions as are recommended by Mr. Muntz in his specification. It follows, therefore, that the two component articles must either originally have been not of the ordinary, but of the purest quality; or, which appears from the evidence to have been the more probable case, that they must have been purified in the course of the process by some mode which is not described or suggested in Collins' specification. As the evidence, therefore, does not satisfy me, that sheathing could be manufactured according to the former patent, I do not consider the novelty of Mr. Muntz's specification to have been successfully impeached by reference to that patent. Then, as to the infringement, it is said that the defendants work according to Collins' specification, and carefully abstain from working according to the specification of the plaintiff. But the same observation applies to this, as to the former part of the case: the analysis proves that the compound consists not of ordinary zinc and copper, but of those minerals in their greatest purity, and in the proportions recommended in the plaintiff's specification. If they were originally combined in this state, the invasion is plain and direct. If they were purified in the course of the process, this, I think, would constitute a colourable invasion of the plaintiff's invention. Objections have been made to the specification; upon this it is not necessary to express any opinion. The patentee, indeed, has been in the possession of his exclusive privilege for several years, and the court will not, on any suggested defect of the specification, allow the enjoyment of that privilege to be disturbed until the title has been decided in a court of law. I am of opinion, therefore, that the order of the Vice-Chancellor must be affirmed. What view may be taken of this case, or in what shape it may present itself when the witnesses come to be examined, *vivâ voce*, in a court of law, I cannot undertake to anticipate. My judgment is formed on the case, as presented to this court by the affidavits filed on the one side and the other in the course of these proceedings. The defendants must pay the costs.

COURT OF COMMON PLEAS.

(Sittings at Nisi Prius, before Lord Chief Justice Tindal and a Special Jury.)

February 8 *to* 13, 1844.

MUNTZ *v.* FOSTER AND OTHERS.

The Attorney-General, the Solicitor-General, Sir T. Wilde, Serjeant Bompas, Mr. M. D. Hill, and Mr. Cowling appeared for the plaintiff; and Mr. Kelly, Serjeant Channell, Mr. Jervis, and Mr. Webster for the defendants.

This was an action brought by order of Vice-Chancellor Bruce to try the validity of a patent obtained by Mr. G. F. Muntz, on the 22d of October, 1832, for "an improved manufacture of metal plates for sheathing the bottoms of ships and other such vessels." The process of coppering vessels, which has of late years been generally adopted, in order to protect their bottoms from the injurious effects of insects in hot countries, and prevent the adherence of barnacles, &c., which greatly impede the progress of the vessel, was nevertheless open to many objections; for not only was the prime cost of the material very great, but the expense of rolling it into sheets, and the frequent renewal of parts which had been injured during the voyage, made this copper covering a serious item in the expences attendant upon fitting out ships.

In order to make this application of copper still more general, Sir Humphry Davy turned his attention to the subject, and endeavoured to devise some method of counteracting the rapid oxidation which took place on its exposure to the sea water, as it was rare for the copper bottom of a ship to last longer than five or six years. It struck Sir H. Davy that if a portion of zinc were applied to the copper, it would counteract the process of oxidation; and a vessel sheathed with copper and zinc plates was accordingly sent a voyage to a distant part of the world, from whence it returned perfectly uninjured by the salt water as far as the metal was concerned, but in as foul a state as if there had been no sheathing upon the bottom of the vessel. The presence of the zinc had prevented the oxidation of the copper, but had changed that electric action which was necessary to resist the marine deposit. The problem, therefore, still remained to be solved, whether any metallic composition could be found for the sheathing of ships, capable of preventing the bottom from fouling, and at the same time resisting the process of oxidation. To the solution of this problem Mr. Muntz, who is a metal-roller at Birmingham, directed his attention, and commenced a series of experiments, which resulted in his taking out a patent in 1832. This invention slowly, but steadily, attracted the notice of the shipping interest of the country, and it appeared that in 1834, in the port of London, 20 ships were sheathed with metal prepared by Muntz's patent process. The number gradually increased, until, in 1843, there were in the same port 257 vessels sheathed with the new composition, of which 17,947 cwt. were sold in the last-mentioned year. The improved metal sheathing was a mixture of copper and zinc, which was cheaper than copper, more easily worked, and lasted longer than the pure metal before used. In the specification of the plaintiff's patent, the nature of his invention is thus described:—"I take that quality of copper known to the trade by the appellation of 'best selected copper,' and that quality of zinc known in England as 'foreign zinc,' and melt them together in the usual manner, in any proportions between 50 per cent. of copper to 50 per cent. of zinc, and 63 per cent. of copper to 37 per cent. of zinc, both of which extremes, and all intermediate proportions, will roll at a red heat; but, as too large a proportion of copper increases the difficulty of working the metal, and too large a proportion of zinc renders the metal too hard, when cold, and not sufficiently liable to oxidation, I prefer the alloy to consist of about 60 per cent. of copper to 40 per cent. of zinc." It was proved on the part of the plaintiff, that any person acquainted with the trade of a metal-roller could manufacture this composition from the description of the invention contained in the specification; and it appeared, that between February and April, 1843, the defendants had made a quantity of sheathing, amounting in value to about £700 or £800, some of which was sold by them in Liverpool; and which, on being analysed, was found to be composed of the same proportions of copper and zinc as those pointed out in the plaintiff's specification as the best alloy for the purpose, viz., 60 per cent. of copper and 40 per cent. of zinc.

For the defence it was pleaded, that there had been no infringement of the patent; that the invention was not new, and that Mr. Muntz was not the first and true inventor, and also, that the specification was bad for uncertainty, &c. Upon the first point, —the infringement, the evidence seemed very clear, but the main ground of defence was, that in 1800 a Mr. Collins obtained a patent for a composition for sheathing ships, which, it was argued, was substantially the same invention as that which the plaintiff claimed as his own. The specification of Collins's patent said, "The yellow sheathing (the sheathing in question) consists chiefly of zinc and copper. The compound must be heated, and in that state rolled. 100 parts of copper and 80 of zinc afford a good composition; but the proportions may be varied, or other metallic substances added, provided the property of bearing the mechanical process, when added, is not destroyed." Evidence was given on the part of the defendants to show that some of the metallic sheathing manufactured by them after April, 1843, was made from the specification in Collins' patent alone, and several witnesses were also called to prove, on their behalf, that a composition of copper and zinc, in the proportion of 60 per cent. of the former to 40 per cent. of the latter, had been made in the years 1828 and 1829, but it did not appear that any plates of this composition had ever been applied to the sheathing of ships. The defendants also raised various objections to the plaintiff's specification.

The Lord Chief Justice, before proceeding to charge the jury, told them that if they were desirous of hearing the whole of the evidence read over, he should wish to take another day for that purpose; but if, having heard the evidence, they did not require that assistance, he would at once proceed to call their attention to the points on which they would have to give their verdict. The jury immediately said, that it would be unnecessary for his Lordship to read the evidence.

The Lord Chief Justice then left it to them to say, in the first place, whether there had been any infringement of the patent granted to the plaintiff, assuming the patent to be good; secondly, if so, whether the manufacture was a new invention, or whether it had been already made public by Collins' patent; and, thirdly, whether the specification of the plaintiff's patent was sufficiently plain and intelligible to enable other persons to make the composition for which the patent had been granted. His Lordship also gave it as his opinion, upon the matters of law arising in the case, that the nature of the plaintiff's invention was well described by the title of the patent—"An improved manufacture of metal plates for sheathing the bottoms of ships or other such vessels;" that neither "best selected copper" nor "foreign zinc" formed part of the invention, which consisted in the discovery of a composition for sheathing by which a proper degree of oxidation was obtained, and no more; that rolling the metal at a red-heat was not claimed as part of the invention; and that the invention did not particularize any proportions but those of 60 per cent. of copper and 40 per cent. of zinc, as applicable for the purpose of making his metallic sheathing, although he had designated other proportions between the extremes of which the metals would melt at a red-heat.

Mr. Kelly tendered a long bill of exceptions to this ruling.

The jury retired at half-past 6 to consider their verdict, and after a short absence returned into court, and found for the plaintiff—damages 40*s*.

List of Patents

Granted by the French Government from the 1*st of October to the* 31*st of December,* 1841.

(Continued from Page 227, Vol. XXIV.)

PATENTS FOR FIFTEEN YEARS.

THE Anzin Mining Company, represented in Paris by M. Perpigna, advocate, 2 ter, Rue Choiseul, for flat cables to be used for mining and other purposes.

Descroisilles, of Paris, represented by M. Perpigna, for ventilated ovens.

Hopwood, of Boulogne-sur-Mer, represented by M. Perpigna, for improved furnaces.

Laming, of Paris, represented by M. Perpigna, for improvements in the manufacture of ammonia.

Newton, of London, represented by M. Perpigna, for an improved machine for setting up type.

Savoye, of Berlaimont, represented by M. Perpigna, for an improved sowing machine.

D'Andelarre, of Traveray, for improvements in blast furnaces.

Auzou, of Rouen, for improvements in cards.

Boishus, of Paris, for improvements in the heating of boilers.

Bonnard, of Beaumont, for improvements in lamps.

Brasil, of Rouen, for a means of giving to gases a mechanical action without using any power.

Brown, of Belleville, for an improved crane.

Chretien and D'Aumont, of Belleville, for a waterproof paint.

Corteuil, of Paris, for a musical instrument called *Violatouche.*

Cox, of London, for a swimming apparatus.

Desplanques, of Lizy-sur-Ourcq, for improvements in the washing of wool.

Dinneford, of London, for a textile fabric for making friction gloves and brushes for horses.

Duvoir, of Paris, for improvements in fire-places.

Giraudeau, of Paris, for gummy capsules for receiving balm of copaiva or cubebs.

Girard Romagnac, of Paris, for an improved piano.

Guerette and Honet, of Flamel, for an improved stove.

Henry, of Paris, for an improved iron bedstead.

Jacquemin, of Bayonne, for an improved medicine, applicable to certain diseases.

Jonval, of Paris, for an improved water-wheel.

Lamy and Lacroix, of Morez, for improvements in spectacles.

Lassus, of Paris, for improvements in the construction of arches.

Lecoq, of Paris, for an improved calefyer.

Manoury d'Estos, of Paris, for an improved water-wheel.

Meens, of Brussels, for colored felting for carpets and other purposes.

Nicholson, of London, for a knitting machine.

Pape, of Paris, for improvements in carriages and vehicles.

Parent, of Paris, for a machine for making buttons.

Roth, of Paris, for a calculating machine.

Sauvage, of Rouen, for an improved loom for weaving fabrics of small breadths, to be used in making suspenders.

Valerius, of Paris, for an improved fire-grate.

Van Gobelschroy, of Paris, for a machine for executing joiners' work.

Van Meerten, of Roppard, Prussia, for a process for giving to all kinds of wood the greatest pliancy.

Vouillon, of London, for a knitting machine.

PATENTS FOR TEN YEARS.

Boucachard and Favre, represented by M. Perpigna, advocate, 2, ter, Rue Choiseul, Paris, for a process for dyeing wool and other fibrous substances.

Chanter, of London, represented by M. Perpigna, for improved furnaces for generating steam.

Delarbre, of Ganges, represented by M. Perpigna, for an improved machine for winding silk.

Hanicq, of Malines, represented by M. Perpigna, for a process for cleaning type without using brushes.

Pecquet de Beaurepaire, of Calais, represented by M. Perpigna, for a method of making a compound fuel by means of coal tar.

Staite, of London, represented by M. Perpigna, for a machine for propelling and ventilating ships.

Baratte and Bouvet, of Paris, for an apparatus for grinding all hard and dry bodies.

Baylay, of Paris, for a new bobbin-net frame.

Blanchon, of Paris, for wooden mosaics to imitate those of Rome.

Cambacères, of Paris, for a method of dessicating, without odour, animal matters employed in the manufacturing of Prussian blue.

Marquis de Clugny, of Paris, for a means of restoring plaster of Paris.

Poupier and Guinnebert, of Paris, for a new mode of refining salt.

Crousse, of Roubaix, for revolving tables used in railroads.

Delvigne, of Paris, for fire-arms for horse soldiers.

Dumas, of Avignon, for an apparatus for clarifying sugar.

Duprat and Daugereau, of Bordeaux, for bleaching sugar without using clay.

Else, of Boulogne-sur-Mer, for a machine for drying corn.

Esra Jenks Coates, of London, for machines for making bolts, studs, and nails.

Miss Gelly, of Bezières, for a syrup applicable to the cure of all cutaneous diseases.

Godémard and Meynier, of Lyons, for the simplification of looms used in the making of shawls.

Guillemont Brothers, of Paris, for a means of manufacturing raised and brocaded fabrics.

Haughton, of London, for a means of preventing accidents on railroads.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

Mar. 27. *John Hosking & Co.*, of Redruth, Cornwall, for a smoke consumer.

27. *R. Wilkins*, of 24, Long Acre, London, for an improved catoptric lamp burner for the combustion of spirits and vegetable naphtha.

26. *John Twist*, of Bridgetown, Stratford-on-Avon, for a design for a cultivator or skim plough.

30. *Jacob Hankins*, of Farningham, in the county of Kent, for a spiral propelling motion for carriages, boats, &c.

30. *William Allen*, of the Lamb Inn, Batheaston, in the county of Somerset, for a washing crimp.

30. *William Hill*, of 12, Tottenham-court, New-road, for a ventilator for buildings.

Apr. 1. *Timothy Smith and Sons*, of Bartholomew-street, Birmingham, for a "Smith's lock" table fastener.

1. *John Vernon & Co.*, of the Dee Iron Works, Aberdeen, for a tilt hammer.

1. *A. Mullar & Co.*, of 43 and 44, Princes-street, Edinburgh, for a cravat fastener.

1. *Hiram Groves*, of 45, Henry-street, Dublin, for a bellows for the melodian and other musical instruments.

4. *George Morton*, of Dale-street, Liverpool, for a design of a new construction for bodies of vehicles.

12. *John Wallis Allen*, of Weymouth, for a pneumatic chimney-top or cowl.

15. *John Weems*, of Johnstone, Renfrewshire, for an improved ash-pan for fire-grates.

15. *Thomas Pritty* and *Henry Rayner Hodgson*, of Bury St. Edmonds, Suffolk, for the "Euston plough."

18. *John Bourn*, of 31, Lionel-street, Birmingham, for "Bourn's Nonpareil sash fastener."

19. *A. Berni & Melliard*, of 56, and 57, Great Guildford-street, Southwark, for a new design for the configuration of a hat ventilator.

List of Disclaimers
OF PARTS OF INVENTIONS AND Amendments
MADE UNDER LORD BROUGHAM'S ACT.

Peter Borrie and Mayer Henry,—memorandum of alteration to patent, dated 3rd August, 1843, for "certain improvements in steam-engines, boilers, and propelling machinery." Filed 3rd April, 1844.

Jonathan Saunders,—disclaimer to patent, dated 5th October, 1843, for "improvements in the manufacture of tyres of railway and other wheels, and in the manufacture of railway and other axles." Filed 6th April, 1844.

List of Patents

That have passed the Great Seal of IRELAND, from the 17th March to the 17th of April, 1844, inclusive.

To William Edward Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, civil engineer, for a new or improved system of machinery or apparatus for obtaining and applying motive power, for propelling on railways, or water, and for raising heavy bodies; applicable also to various other purposes where power is required,—being a communication.—Sealed 27th March.

Edward Eyre, of Thavies Inn, Holborn, in the City of London, Gent., for certain improvements in railways, and in the machinery or apparatus to be employed thereon,—being a communication.—Sealed 27th March.

Pierre Pelletan, of Fitzroy-square, in the county of Middlesex, Esq., for improvements in the production of light.—Sealed 17th April.

Thomas Aspinwall, of Bishopsgate Churchyard, in the City of London, Esq., for an improved cannon, formed either of wrought iron or steel, or wrought iron and steel combined; and also instruments and machinery used in making, and method of making said cannon,—being a communication.—Sealed 17th April.

List of Patents

Granted for SCOTLAND, subsequent to March 22*nd*, 1844.

To William Ritter, of 106, Fenchurch-street, in the City of London, Gent., for improvements in crystallizing and purifying sugars,—being a communication from abroad.—Sealed 26th March.

Charles Harrison, manager of the Coed Talon and Leeswood Iron Works, Flintshire, for certain improvements in the manufacture of cast-iron pipes, and other iron castings.—Sealed 26th March.

William Isaac Cookson, of the borough and county of Newcastle-upon-Tyne, Esq., for improvements in apparatus for burning sulphur in the manufacture of sulphuric acid.—Sealed 26th March.

Elisha Haydon Collier, of Goldsworthy-terrace, Rotherhithe, in the county of Surrey, civil engineer, for certain improvements in the construction of furnaces and flues.—Sealed 27th March.

Joseph Dickenson Stagg, of Middleton, in Teesdale, in the county of Durham, manager of smelting works, for a new or improved plan for collecting, condensing, and purifying the fumes of lead, copper, and other ores and metals; also the particles of such ores and metals arising or produced from the roasting, smelting, or manufacturing thereof; and also the noxious smoke, gases, salts, and acids, soluble and absorbable in water, generated in treating and working such ores and metals.—Sealed 30th March.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, civil engineer and patent agent, for an improvement or improvements in furnaces,—being a communication from abroad.—Sealed 4th April.

John Stevelly, of Belfast, in the county of Antrim, Professor of Natural Philosophy, for improvements in steam-engines.—Sealed 10th April.

Thomas Nash, of Paul's Cray, in the county of Kent, paper-maker, and Francis Pirie, of Watling-street, in the City of London, paper-maker, for certain improvements in the manufacture of paper, and in the machinery to be used therein.—Sealed 11th April.

William Thomas, of Cheapside, in the City of London, merchant, for improvements in fastenings for wearing apparel; and which may also be applied as fastenings to portmanteaus, bags, boxes, books, and other things,—being a communication from abroad.—Sealed 15th April.

John Lawson, of Leeds, in the county of York, engineer, and Thomas Robinson, of Leeds, in the county of York, flax-dresser, for certain improvements in machinery for heckling, dressing, combing, and cleaning, flax, wool, silk, and other fibrous substances.—Sealed 17th April.

New Patents

SEALED IN ENGLAND.

1844.

To Charles Hector François Dumontier, of Rouen, in the kingdom of France, engineer, for improvements in the construction of lithographic and autographic presses,—being a communication. Sealed 28th March—6 months for inrolment.

John Robert Dicksee, of Old Compton-street, Soho-square, artist, for improvements in the manufacture of mosaics.—Sealed 30th March—6 months for inrolment.

William Crosskill, of Iron-works, Beverley, for improvements in machinery for making wheels for carriages. Sealed 30th March—6 months for inrolment.

Henry Clayton, of Upper Park-place, Dorset-square, Regent's-park, plumber, for improvements in the manufacture of tiles, drain-pipes or tubes, and bricks. Sealed 30th March—6 months for inrolment.

John Biggs, of Leicester, manufacturer, and Richard Harris, of the same place, manufacturer, for improvements in the manufacture of looped, woven, and elastic fabrics. Sealed 30th March—6 months for inrolment.

Leonard Bostwick, of Fen-court, Fenchurch-street, London, merchant, for certain improvements in machinery or apparatus, for sewing all kinds of cloth or other materials. Sealed 2nd April—6 months for inrolment.

William Stace, of Berwick, Sussex, farmer, and Philip Vallance, of the same place, farmer, for improvements in applying power for drawing or working ploughs, and other implements and carriages, used for agricultural purposes. Sealed 2nd April—6 months for inrolment.

John Parsons, of Selwood-terrace, Brompton, Gent., for certain improvements in machinery or apparatus for cleansing or sweeping chimneys and flues. Sealed 2nd April—6 months for inrolment.

James Murdoch, of Staple's-inn, Middlesex, mechanical draftsman, for certain improved apparatus and processes for preparing the Phormium Tenax, or New Zealand flax, so as to render it applicable to various useful purposes,—being a communication. Sealed 2nd April—6 months for inrolment.

Frederick Brown, of Luton, Bedfordshire, ironmonger, for improvements in stoves. Sealed 10th April—6 months for inrolment.

James Murray, of the Garnkirk Coal Company, Lanark, Scotland, for a new method of using and applying artificial gas, made from coal, oil, or other substances, for lighting and ventilating caverns, pits, or mines, or other pits where minerals or metals are worked or extracted. Sealed 10th April—4 months for inrolment.

Richard Barber, of Hotel-street, Leicester, confectioner, for improvements in apparatus for giving quick rotatory motion to mops and such like instruments. Sealed 10th April—6 months for inrolment.

John Aitken, of Surrey-square, for improvements in water machines or engines, and steam engines, and the mode of traction on or in canals, or other waters or ways. Sealed 10th April—6 months for inrolment.

George William Lenox, and John Jones, of Billiter-square, London, merchants, for improvements in the manufacture of sheaves and shells for blocks, and of bolt-rings or washers, for the purposes of shipwrights and engineers. Sealed 10th April—6 months for inrolment.

James Kennedy, of the firm of Bury, Curtis, and Kennedy, of Liverpool, engineer, and Thomas Vernon of the same place, iron-ship builder, for certain improvements in the building or construction of iron and other vessels, for navigation on water. Sealed 15th April—6 months for inrolment.

John Lawson, of Leeds, engineer, and Thomas Robinson, of Leeds, flax-dresser, for certain improvements in machinery for heckling, dressing, combing, and cleaning flax, wool, silk, and other fibrous substances. Sealed 16th April—6 months for inrolment.

Edgar Heale, of Brixton, Gent., for certain improvements in the construction of carriages for the conveyance of passengers on roads and railways. Sealed 18th April—6 months for inrolment.

Donald Grant, of Greenwich, Esq., for improvements applicable to the ventilation of apartments, in which, gas and other combustible matters are consumed by ignition. Sealed 18th April —6 months for inrolment.

John Bailey Denton, of Gray's-inn-square, land agent, for improvements in machinery for moulding or shaping clay and other plastic substances, for draining and other purposes. Sealed 18th April——6 months for inrolment.

James Murdoch, of Staple's Inn, mechanical draughtsman and civil engineer, for certain improvements in the construction of vessels for holding aerated liquids, and in the means for introducing such liquids into the said vessels, and retaining them therein,—being a communication. Sealed 18th April—6 months for inrolment.

John Smith, of Bradford, Yorkshire, worsted spinner, for improvements in machinery for tentering and stretching cloths or fabrics. Sealed 18th April—6 months for inrolment.

Richard Roberts, of the Globe Works, Manchester, engineer, for certain improvements in machinery or apparatus for the preparation of cotton and wool, and also for spinning and doubling cotton, silk, wool, and other fibrous substances. Sealed 18th April—6 months for inrolment.

Joseph Woods, of Barge Yard Chambers, Bucklesbury, Gent., for improvements in regulating the power and velocity of machines for communicating power,—being a communication. Sealed 18th April—6 months for inrolment.

William Hodson, of New King-street, Kingston-upon-Hull, estate agent, for a machine for making and compressing bricks, tiles, square-pavers, and ornamental bricks. Sealed 18th April—6 months for inrolment.

Henry Frearson, of Arno Vale, Nottingham, lace manufacturer, for improvements in the manufacture of warp fabrics. Sealed 23rd April—6 months for inrolment.

Peter Lear, of Boston, Suffolk, of the State of Massachusetts, of the United States of America, Gent., for certain new and useful improvements in machinery for propelling vessels through the water. Sealed 23rd April—6 months for inrolment.

William Taylor, of Birmingham, door-spring manufacturer, for improvements in the manufacture of axle pulleys, and in pegs or pins for hanging hats or other garments thereon. Sealed 24th April—6 months for inrolment.

René Allaire, of Charlotte-street, Fitzroy-square, dyer and cleaner, for improvements for cleansing gentlemen's garments. Sealed 24th April—6 months for inrolment.

Pierre Armand le Comte de Fontainemorean, of Skinner's-place, Size-lane, merchant, for a new mode of constructing barometers and other pneumatic instruments,—being a communication. Sealed 27th April—6 months for inrolment.

John Dixon, of Wolverhampton, iron-master, for improvements in heating air for blast furnaces, and for other uses. Sealed 27th April—6 months for inrolment.

Arthur Wall, of Bisterne-place, Poplar, surgeon, for certain improvements in the manufacture of steel, copper, and other metals. Sealed 27th April—6 months for inrolment.

Josiah Clarke and Samuel Fletcher, of Hulme, Lancashire, machine makers, for certain improvements in wheels to be used in slubbing or bobbin-frames, and in roving or jack-frames, and for other purposes; and also in the engine by which such wheels are, or may be, cut. Sealed 27th April—6 months for inrolment.

Isaiah Davies, of Birmingham, engineer, for certain improvements in steam-engines, part of which improvements are applicable to impelling wheel carriages. Sealed 27th April—6 months for inrolment.

Edward Cobbold, of Melford, Suffolk, Master of Arts, clerk, for improvements in the preparation of peat, rendering it applicable to several useful purposes, particularly for fuel. Sealed 27th April—6 months for inrolment.

CELESTIAL PHENOMENA FOR MAY, 1844.

D.	H.	M.	
1			Clock after the sun, 3m. 4s.
—			☽ rises 6h. 24m. A.
—			☽ passes mer. 11h. 15m. A.
—			☽ sets 3h. 27m. M.
2	3	16	Ecliptic oppo. or ○ full moon
	9		☽ in Perigee
4	19	25	☿ greatest elong. 21. 7. E.
5			Clock after the sun, 3m. 30s.
—			☽ rises 11h. 18m. A.
—			☽ passes mer. 2h. 22m. M.
—			☽ sets 6h. 22m. M.
8	1	14	♄ in conj. with the ☽ diff. of dec. 4. 50. S.
	12	32	Juno in conj. with the ☉
9	8	23	☽ in □ or last quarter
10			Clock after the sun, 3m. 49s.
—			☽ rises 1h. 22m. M.
—			☽ passes mer. 6h. 52m. M.
—			☽ sets 0h. 33m. A.
	19	42	Pallas in oppo. to the ☉ intens. of light, 0·661.
12	1	26	♃ in conj. with the ☽ diff. of dec. 6. 43. S.
	17	33	♅ in conj. with the ☽ diff. of dec. 6. 1. S.
14	0	54	♀ greatest elong. 45. 22. E.
15			Clock after the sun, 3m. 53s.
—			☽ rises 2h. 59m. M.
—			☽ passes mer. 10h. 28m. M.
—			☽ sets 6h. 9m. A.
16			Mercury R. A. 4h. 40m. dec. 23. 26. N.
—			Venus R. A. 6h. 49m. dec. 26. 7. N.
—			Mars R. A. 5h. 17m. dec. 23. 58. N.
—			Vesta R. A. 20h. 36m. dec. 18. 9. S.
—			Juno R. A. 3h. 29m. dec. 11. 10. N.
—			Pallas R. A. 15h. 55m. dec. 25. 37. N.
—			Ceres R. A. 16h. 0m. dec. 14. 11. S.
—			Jupiter R. A. 23h. 51m. dec. 2. 7. S.
—			Saturn R. A. 20h. 39m. dec. 18. 52. S.
—			Georg. R. A. 19h. 45m. dec. 1. 22. N.
—			Mercury passes mer. 1h. 30m.
—			Venus passes mer. 3h. 11m.
—			Mars passes mer. 1h. 39m.
—			Jupiter passes mer. 20h. 11m.
—			Saturn passes mer. 16h. 59m.
—			Georg. passes mer. 20h. 39m.
10			☽ in Apogee
	22	48	♄ stationary
17	3	51	☿ stationary
	8	53	Ecliptic conj. or ● new moon
	14	35	♃'s third sat. will im.
18	3	40	☿ in conj. with ☽ diff. of dec. 0. 32. N.
19	0	51	♂ in conj. with the ☽ diff. of dec. 1. 40. N.
	13	42	Vesta in conj. with ♄ diff. of dec. 0. 42. N
20			Juno in Perihelion
	8	28	Ceres in oppo. to the ☉ intens. of light, 1·036
	22	3	☿ in the descending node
			Clock after the sun, 3m. 44s.
—			☽ rises 6h. 13m. M.
—			☽ passes mer. 2h. 28m. A.
—			☽ sets 10h. 35m. A.
21	1	19	♀ in conj. with the ☽ diff. of dec. 5. 57. N.
22			Occul. 29 Cancri, im. 11h. 29m. em. 11h. 59m.
24	9	36	Vesta in the descending node
25			Clock after the sun, 3m. 20s.
—			☽ rises 11h. 54m. M.
—			☽ passes mer. 6h. 25m. A.
—			☽ sets 0h. 22m. M.
	7	30	☽ in □ or first quarter
27			Occul *q* Virginis, im. 7h. 29m. em. 8h. 5m.
28	10	23	☿ in inf. conj. with the ☉
29	14	28	♃'s first sat. will im.
30	19		☽ in Perigee
			Total Eclipse of the moon
31	8	14	Begins } Mean time, Magnitude
	10	50	Middle } of the eclipse 1·327. on
	1	26	Ends } the northern limb.
	10	47	Ecliptic oppo. or ○ full moon

J. LEWTHWAITE, Rotherhithe.

THE

LONDON JOURNAL

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No. CL.

RECENT PATENTS.

To Charles Kurtz, *of Liverpool, in the county of Lancaster, manufacturing chemist, for an improved lamp for the combustion of naphtha, turpentine, and other resinous oils.*—[Sealed 30th June, 1843.]

This invention applies particularly to lamps constructed for the combustion of naphtha, turpentine, and other resinous oils. The ordinary naphtha lamp is now well known, as are also the disadvantages of employing the same for the purposes of illumination, particularly the limited height of the flame produced during combustion, which scarcely ever exceeds an inch without the emission of smoke; and also the disagreeable odour arising from imperfect combustion of the spirit. In consequence of these imperfections in the ordinary lamp, the use of naphtha and other resinous oils for the purpose of illumination, has been to a great degree excluded, where a powerful flame is required; and also in confined apartments, where the unconsumed portions of the spirit become both deleterious and offensive. The object, therefore, of the present invention, is to increase the amount of illuminating power in such lamps, that is, to elongate the flame to a considerable degree, and also to effect the perfect combustion of the naphtha or other resinous oil, thereby preventing the emission of either smoke or unpleasant effluvia. These improvements are effected simply by the proper admission and regulation of air, required in the process of combustion, by the application and use of suitable valves or regulators, and the particular situations in which they are placed. In Plate XIII., are several views of the improved lamp for the combustion of naphtha or other resinous oils, and also several modifications and applications of the principle thereof, in order that it may be more generally and usefully applied.

Fig. 1, is a sectional elevation of the improved naphtha lamp, with a single flat wick or burner; and fig. 2, is a horizontalor plan view of the same, as seen from above. Fig 3, is a similar sectional view of a lamp with a double flat wick or burner; and fig. 4, is a horizontal or plan view of the same.

Fig. 5, represents in elevation, and fig. 6, in plan view, a lamp particularly adapted for burning common naphtha or resinous oils, which generally produce a considerable quantity of carbon, during combustion, on the top or edge of the wick. Fig. 7, is a sectional elevation of the improved naphtha lamp, adapted or arranged as a table or pillar lamp, with circular wick or burner. Fig. 8, is another modification constructed with a common argand burner; and fig. 9, is a modification of the improved lamp constructed and applied as a street lamp or lantern. In figs. 1 and 2, *a*, *a*, is the reservoir of naphtha; *b*, *b*, the ordinary cone or conductor for supplying air to the flame, but with this difference, that in the improved lamp the top edge of these side plates or air conductors, must always be above the point of ignition of the wick, whereas in ordinary naphtha lamps the wick has always been uppermost. These air conductors or passages *b*, *b*, may be made of metal, glass, or mica, and are supplied with an air valve, damper, or regulator *c*, swivelling on its centre, and either opened or closed, to regulate the admission of air, by a small hand-screw *d*, on the outer side. There is also an auxiliary air-valve damper or regulator *e*, to govern the admission of air on the other side of the conductor *b*; by opening or closing these valves, the supply of air requisite for perfect combustion may be suitably governed, and the flame elongated to a great extent, without incurring either of the ordinary consequences of smoke, or any disagreeable odour.

The arrows show the course of the air through the novel arrangement of air passages in all the figures. The wick-holder is shown at *f, f,* and has one peculiarity only from the common holder, namely, that the outer side at the top *g*, is left longer than the inner side, as much as the small length of wick required for burning; so that in trimming the wick it may be cut quite flat and level with the outer side of the wick-holder, and thus always be cut perfectly even and fit for use. In figs. 3 and 4, the only difference is the arrangement consequent upon the use of a double wick, in which case, the air valve *c*, is placed at the bottom of the lamp, and thus regulates the draft up the central tube or air passage *h*, supplying the requisite quantity between the wicks, as well as the ordinary draft supplied by the side cone or conductor *b, b*. In figs. 5 and 6, the arrangement is varied, for the purpose of adapting it to the consumption of very common naphtha, or resinous oils, which usually generate much carbonaceous matter on the burning edge of the wick, and thus require frequent snuffing or trimming. This difficulty is overcome by providing two circular boxes or receivers *i, i,* in each of which is placed a small roller or bobbin, and having one end or coil of the wick around each; the wick extending from one bobbin to the other, passing through the reservoir *a, a,* and having only the central portion exposed, which is under the glass chimney, and distinguished by the representation of flame in the drawing; thus, when this burning or exposed portion of the wick has become corroded or charred, another portion of the wick can be exposed to the flame, by simply turning one of the bobbins and winding the wick progressively through the lamp, as required. In fig. 7, where a circular wick is employed, the patentee prefers applying the air valve *c*, or regulator, below, and with the addition of a top guide or disc *k*, which confines the supply of air directly to the inside of the wick, instead of allowing it pass up the centre of the air tube. In this instance, a ring *l*, of ivory, bone, wood, or other non-conducting material, is placed between the ordinary cone and reservoir, for the purpose of preventing the communication of heat to the reservoir. At fig. 8, where a common argand burner is used, the air valve *c*, is applied below, as the air is supplied through spaces *m*, *m*, left between the bottom of the burner and the reservoir; the wick being divided below into two semicircular parts, one half passing down each supporter *n*, *n*, into the reservoir. At fig. 9, the patentee also applies his improved air valve below the burner, as being well adapted for street lamps or lanterns. In this application, a double glass *o*, *o*, is employed, which forms an air chamber or passage, without obstructing the light, and by this means the lamp is supplied with any requisite quantity of air; when the lamp or lanterns are made circular, the glasses must of course be entirely double, and open into the lamp below, to form the necessary air passage; or in both these cases, the air valve may be used at the top of the double glass chamber, or casing, with nearly the same effect.

The patentee claims, Firstly, the arrangement, application, and use, of certain air passages and valves, or regulators, in lamps, for the combustion of naphtha, or other resinous oils, as above described, whereby the flame is considerably elongated and increased, together with the more perfect combustion of inflammable matter used. Secondly, the peculiar application and use of the ordinary air cones or conductors *b*, *b*, with respect to single or double flat wick burners, which in the improved naphtha lamp must be so placed, that the uppermost edge of the conductor shall be above the point of ignition on each side of the wick, so that the air conducted to the outer sides of the flame, shall impinge upon the flame at that point.—[*Inrolled in the Petty Bag Office, December,* 1843.]

Specification drawn by Messrs. Newton and Son.

To James Moon, *of Millman-street, Bedford-row, in the county of Middlesex, surveyor, for improvements in the manufacture of bricks, to be used in the construction of chimneys and flues.*—[Sealed 25th April, 1843.]

This invention consists in making bricks of suitable shapes for forming circular flues or interiors of chimneys, and, at the same time, bonding with the general brickwork. A contraction is made in the throat of the chimney, instead of the large void usually left, and by this means a better draft is produced. The diversions or elbows of the flues are formed with "splayed gathering bricks," or with "moulded springers," and a uniform size is preserved throughout; whereas, in the ordinary constructions of flues, the elbows are, in most cases, formed by cutting, which causes them to be crippled and contracted, producing obstructions and lodgments of soot.

In Plate XIII., fig. 1, is a vertical section of a chimney constructed with the improved bricks, and fig. 2, is a vertical section of the lower part thereof, taken from front to back; fig. 3, is a front view, fig. 4, a plan, and fig. 5, a back view of the chimney-bars; and figs. 6, to 11, inclusive, are plan views of the different courses of bricks forming the chimney. The chimney-bars *a*, are composed of a front plate and bed to receive "gussets;" bearing-bars *b*, are placed across the opening, to carry the throat of the chimney, having hooks on their under sides for the soot bag and cloth used when cleaning the chimney. The throat is formed of moulded lumps *c*, *d*, *e*, *f*, two to each course, and without any vertical joints externally: the courses are shewn separately at figs. 6, and 7, The flue is made with two descriptions of moulded bricks *g*, *h*, termed "bonders" (fig. 8), and "stretchers" (fig. 9), used alternately, four to each course. The diversions or elbows are formed with "splayed gathering bricks" *i*, (one of which is shewn at fig. 10), or with "moulded springers" *j*, as seen in the section fig. 12; by means of the latter, the elbows may be made to run horizontally, or at any required angle; and where the flue runs from one diameter to another, "connecting bricks" *k*, (fig. 11,) are used. For making the shaft *l*, of the chimney, any of the four kinds of bricks represented at figs. 13, 14, 15, and 16, may be used, according to the form of shaft required; and at the top of the shaft the patentee places what he calls a "valvular ring" *m*, supporting a "domical top" *n*, and contained in a moulded cap *o*.

At the conclusion of the specification, the patentee says: "Having thus described my invention, I wish it to be understood that, in thus forming bricks suitable for making circular flues of chimneys, I claim, First, the so forming them as to bond in with the general brickwork; Secondly, the making of holes through bricks suitably formed for producing circular flues of chimneys; Thirdly, the mode of constructing chimney-bars, as above described; and Fourthly, the mode of applying a domical top and valvular ring to tops of chimneys, as above described."—[*Inrolled in the Inrolment Office, October*, 1843.]

To JOHN THOMPSON, *of Albury, near Guildford, in the county of Surrey, Doctor of Medicine, for his invention of certain improvements in bedsteads and couches for invalids.*—[Sealed 16th May, 1843.]

THESE improvements in bedsteads and couches for invalids, consist in certain peculiar constructions of the parts of a bedstead or couch, and of a frame to accompany the same; by means of which constructions the bed, mattress, or cushion, may be withdrawn from under the patient, and replaced, after adjusting, cleaning, or airing it, without disturbing the limbs, or altering the posture of the body. These objects are effected by making the bedstead or couch distinct from an outer framing; to the latter of which a sheet is attached, and distended over side rails, for the purpose of occasionally supporting the patient, independently of the bed, mattress, or cushion. This may be done by raising that part of the outer frame to which the distended sheet is attached; or by lowering the bedstead or couch on which the bed, mattress, or cushion, bears, so as to leave the patient supported by the distended sheet, whilst the bedstead or couch, with the bed, mattress, or cushion, is withdrawn.

In Plate XIV., fig. 1, represents a side elevation of the bedstead *a, a,* enclosed by the outer framing, with the distended sheet raised, to allow of the bedstead and its mattress being drawn out from the frame, as it is partly done in fig. 2, which is a plan view of the bedstead. A transverse section of the outer framing is shewn at fig. 3; and at fig. 4, the bedstead or couch is represented drawn out, and distinct from the framing fig. 3. The bedstead or couch *a, a,* may be made as a rectangular horizontal frame, with transverse rails, or straps, or a sacking; and it may be mounted on four legs with castors, as shewn; or constructed in any other convenient manner, so as to support the bed, mattress, or cushion, and be rendered capable of sliding in and out of the external frame. The external frame consists of four vertical pillars *b, b, b, b,* firmly connected together by three horizontal rails *c,* and *d, d.* The rail *c,* occupies the closed side of the frame, the opposite side being open, that is, without a rail. The two rails *d, d,* have each a ledge or bead *e, e,* as seen in figs. 1, and 3; and there are grooves or recesses cut in the end rails of the bedstead *a,* for the reception of the beads *e, e,* when the bedstead is slidden into the frame. The two moveable side rails *f, f,* are attached to the outer frame by vertical screws *g, g,* mounted in the pillars *b,* which screws pass through screw boxes in the ends of the moveable rails *f;* to these moveable rails the two edges of a sheet *i, i,* are made fast by loops, passed over studs on the under side of the rail, and being drawn tight, distend the sheet, as seen in figs. 2, and 3. The positions of the parts seen in fig. 1, represent the bedstead within the outer frame, with the sheet *i, i,* attached to the rails *f, f,* extended over the bed. When it is required to make the bed, or adjust the bedding, mattress, or cushion, without disturbing the patient, a winch is to be applied to the top of the vertical screws *g, g,* when, by turning those screws, the side rails *f, f,* will be drawn up, with the distended sheet *i,* supporting the patient. This being done, the bedstead or couch *a, a,* with the bed, mattress, or cushion, may be drawn out, as shewn at fig. 4, and adjusted; and on replacing the bedstead, the side rails *f*, *f*, with the distended sheet, bearing the patient, may be again lowered, so as to bear upon the bed, mattress, or cushion.

The patentee states, that he does not confine himself to the mode shewn in the drawings, of raising and lowering the distended sheet on which the patient rests, as that may be effected by various mechanical contrivances well known; nor to the manner of attaching the sheet to the moveable side rails, as that may be done in several ways; and in some instances it may be desirable to enable a part of the side rail to turn upon a horizontal axle, for the purpose of drawing the sheet up to tension, or allowing it to hang loosely. But in all cases the edges of the sheet must be so connected to the moveable side rails, that they may be readily detached from the rails when the patient is supported by the bed; in order that, when so detached, the sheet may be drawn out from under the patient, without disturbing or shifting his reclining position. The patient being by this means transferred on to a clean sheet, upon the fresh made or adjusted bed, the edges of the clean sheet may be attached to the side rails as before, ready to support the patient, if required, by the means already explained. In some cases, the side rails *f*, *f*, with the distended sheet *i*, may be preserved in a fixed position in the outer frame, and the bedstead or couch be made capable of being raised and lowered by its legs sliding vertically in sockets, or by some other convenient means which would answer the same purpose. The patentee, therefore, desires it to be understood, that the particular features of his invention, are, so connecting an outer framing to a bedstead or couch, that a sheet, capable of supporting a patient, may be distended from the outer framing, over the bed, mattress, or cushion, and that by such means the patient may be raised up from the bed, or the bed lowered from the patient, without disturbing or altering his reclining position; and that he may be safely supported upon such sheet, whilst the bed, mattress, or cushion, is being adjusted or supplied with fresh bedding.—[*Inrolled in the Rolls Chapel Office, November,* 1843.]

Specification drawn by Messrs. Newton and Son.

To HENRY BESSEMER, *of Baxter House, St. Pancras, in the county of Middlesex, engineer, for certain improvements in the manufacture of bronze and other metallic powders.* —[Sealed 15th June, 1843.]

THESE improvements consist, Firstly, in the use of oil or other unctuous matter, to facilitate the reduction of metals or alloys of metals into fine powder; Secondly, in an arrangement of machinery for grinding metals or alloys of metals; and Thirdly, in removing the oil from the powder by means of water and pressure.

The machinery is represented in Plate XIII., fig. 1, being an end view, and fig. 2, a side view of the frame-work, containing two grinding machines, one of which is shewn in section. Each grinding machine consists of a polished steel bed *a*, upon which a great number of upright steel rods *b*, work; the bed *a*, rests upon a foundation plate *c*, and is formed in six parts, fixed around a steel step *d*, and grooved radially therefrom, as represented in the plan view fig. 3. The step *d*, receives the lower end of a vertical shaft *e*, to which the boss of the drum *f*, is fixed; this drum is for the purpose of holding the perpendicular rods *b*, which are capable of adapting themselves to the grooved surface of the bed *a*; the drum is made of gun-metal, and divided into four parts by arms or partitions, which, instead of being straight, are made of the peculiar form shewn at *g*, *g*, in the plan view, fig. 4, for the reason hereafter mentioned. On the top of the shaft *e*, is a bevil-pinion *h*, gearing into a bevil-wheel *i*, on the horizontal shaft *j*, which receives motion through the spur-wheel *k*, and pinion *l*, from the shaft *m*, driven by a steam-engine or other source of power; by this means the shaft *e*, and drum *f*, are caused to revolve, and carry round the rods *b*, upon the bed *a*. The rods are made about twenty-two inches long, and have polished hemispherical ends; in one of the machines about 49,240 are used, being ¼ of an inch in diameter, and weighing 6oz. each; and in the other, or finishing machine, four times that number are employed, having a diameter of only ⅛th of an inch.

The mode of operating upon the metals or alloys, in order to produce a fine powder, is as follows:—The metal, after being reduced to a very thin leaf, by beating between skins, in the manner usually practised by gold beaters, is put into an iron wire sieve, of ten meshes to the inch; olive oil is then allowed to flow from a stop-cock, over the centre of the sieve, on to the leaf metal, which is briskly moved over the surface of the sieve by a wire brush, until the whole is forced through into a vessel below. This mixture of metal and oil is then introduced through the funnel or hopper *n*, of the machine containing the largest rods, on to the centre of the bed *a*, where it spreads, and flowing amongst the rods, is caused, by their rotation, to gradually approach the periphery of the bed *a*, and escape into the circular trough *o*, from whence it is conducted by the spout *p*, into the vessel *q*. In its progress, the metal is acted upon by the polished hemispherical ends of the rods, as they ascend and descend the corrugated surface of the bed, and which, by a sort of tearing and burnishing operation, separate the coarse pieces of leaf into numerous polished particles. By being passed three times through this machine, the metal is reduced to the quality of the coarse sorts of bronze powder; it is then passed through the machine containing the smaller rods, until the required degree of fineness is attained.

When the metal has been reduced to a sufficiently fine powder, the contents of the vessel *q*, (which will be generally about 10lbs. of metal, and 10lbs. of oil) are put into a strong bag, made of three thicknesses of fustian, with their respective seams at different parts of the circumference, so as to prevent the particles of metal from passing through. The bag is placed on the bed of an hydraulic press, and, being subjected to a pressure of 5000lbs. to the square inch, or about 300 tons on a bag of one foot diameter, nearly all the oil is expelled; the pressure is then removed, the bag is filled with boiling water, and, after its contents have been well stirred up, it is again subjected to pressure. The patentee here remarks, "it is well known that oil and water unite when subject to a great pressure, and form a milky-looking fluid; it is this peculiar property that enables me to get rid of the oil, which is effectually done, by from two to three times repeating the operation." The bag is now emptied of its contents, which consist of bright metallic particles, and an extremely small quantity of water, forming a dense lump, of nearly the original specific gravity of the metal; this lump is cut with a knife into slices, half an inch thick, and exposed to the air of a warm room, where the water evaporates, and the slices may then be crumbled into powder. The reason for giving the arms *g*, the shape shewn in fig. 4, is this; that, as there are no rods resting upon the bed *a*, at those parts where the arms are passing, those arms, if straight, would form a passage, through which the fluid materials might flow uninterruptedly from the centre of the bed into the trough *o*; a recess or bend is therefore made in each arm, and filled with rods, so as to intercept the passage of the materials, and cause them to pass between and under the rods.

The patentee claims, Firstly, the peculiar combination of machinery herein described, for tearing, rubbing, and polishing particles of metal, by means of a polished steel or other suitable grooved surface, acted on by a number of small polished rods or pieces of metal, forming a sort of flexible counterpart, so that such pieces of leaf metal as are being acted upon between the said surfaces at one particular part, do not prevent the pressure or action of another. Secondly, the use of oil or other similar unctuous matter, to assist in the reduction of the metals or alloys of metals into fine particles or powder. Thirdly, the use of water, assisted by pressure, as hereinbefore described, for the purpose of removing the superfluous quantity of oil which is used to facilitate the reduction of metals or alloys of metals into fine powder.—[*Inrolled in the Inrolment Office, December,* 1843.]

To Thomas Marsden, *of Salford, in the county of Lancaster, machine-maker, and* Solomon Robinson, *of the same place, flax dresser, for improvements in machinery for dressing or heckling flax and hemp.*—[Sealed 8th September, 1842.]

This invention consists in a peculiar mode of arranging and working the heckle-bars of machinery for dressing flax and hemp.

In Plate XIV., fig. 1, is a side view of the improved heckling machine; and figs. 2, 3, and 4, are detached views of the heckle-bars, and parts connected therewith. *a*, is the main-shaft, driven by a band from a steam-engine, and communicating motion, through the cog-wheels *b*, *c*, to the shaft *d*, parallel thereto; from each end of these shafts four arms *e*, project, at right angles, and to these arms the heckle-bars *f*, eight in number, are jointed (see figs. 2, and 3). It will be seen that the heckle-bars of one shaft, in their revolution, pass within the circle described by the heckle-bars of the other shaft, and they are so arranged as to give alternately a stroke or cut to the flax or hemp, suspended from the trough *g*, by the holders *h*; that is, the heckles on one of the bars connected to the shaft *a*, will give a stroke to the flax on one side, and, immediately after, the heckles on one of the bars connected to the shaft *d*, will give a similar stroke on the other side of the strick of flax, and so on alternately. In order that the heckles shall penetrate the strick of flax at right angles, or nearly so, a plate *i*, carrying a stud *j*, is fixed to each heckle-bar; this stud works in an excentric ring *k*, of which there are two, one at either side of the machine, for the purpose of working the two sets of heckle-bars. By this means, an excentric motion is imparted to the bars, instead of a circular one, which would be the case if they were firmly fixed to the arms *e*; the heckles may thus be caused to penetrate the flax at any required angle, to keep that angle as they pass through the body of the flax, and to assume the proper positions for being cleared of the tow, as they revolve, by the brushes *l*, *l*, to which rotary motion is communicated from the shafts *a*, and *d*, by the cog-wheels *m*, *m*, and pinions *n*, *n*, *o*, *o*, and *p*, *p*; the tow is removed from the brushes by the cylinders *q*, *q*, covered with card teeth, and driven by the train of wheels connected with the shafts *a*, *d*; the cylinders *q*, *q*, are stripped of the tow by their respective doffing-plates *v*, *v*, fastened to arms projecting from the shafts *w*, *w*, which are worked by connecting rods *x*, *x*, from two excentrics *y*, *y*, on the shafts of the rotary brushes.

The trough *g*, containing the flax-holders *h*, is attached to two arms *z*, one at each side of the machine; the lower parts of these arms work in fixed slides 1, and each arm is suspended by two chains 2, 2; one chain passes over the pulley 3, and is secured to the weight 4, and the other, passing over the pulley 5, is fastened to the lever 6, which is furnished with a friction roller 7, acted on by the cam 8, and has a weight 4* suspended from it: the cams 8, are mounted on a shaft 9, driven by a train of wheels from the shaft of one of the cylinders *q*. As the weights 4, 4*, are heavier than the trough *g*, holders *h*, and arms *z*, they lift the trough as high as the cams 8, will permit, by allowing the levers 6, to descend; so that when the rollers 7, are at those parts of the cams which are nearest the centre of the shaft 9, the trough is at its greatest elevation; but, as the shaft revolves, the larger diameters of the cams raise the levers 6, and weights 4*, and the trough *g*, having only the weights 4, to counterbalance, gradually descends; then, as soon as the rollers 7, have passed the largest diameters of the cams, they rapidly descend the inclined planes thereof, and the weights 4, and 4*, acting in combination, quickly raise the trough. Whilst the trough is falling, a holder of flax is fixed in it at one end, which projects beyond the framing of the machine; and, on the trough rising, the attendant pushes the holder into that part of the trough which is over the coarsest heckle; this operation (which may be performed by the action of the machine, if required) moves all the other holders in the trough, pushing the furthest out at the other side of the machine, with one end of the flax finished, and placing all the other holders, with the flax partly heckled, opposite finer heckles than before; the position of the flax contained in the holder which has been pushed out of the machine is then reversed, as usual, and the other end of the strick of flax is dressed and finished, by being passed again through the machine.

The patentees claim, as their invention, placing the heckles and heckle-bars on arms, (with a joint in each arm) attached to two separate shafts or axles, which are so placed, that the heckles, heckle-bars, and part of the arms on one shaft, shall pass within the circle described by the heckles on the other shaft, and so on alternately; the flax being by this means carried beyond its vertical position by every alternate stroke or cut it receives from the heckles, in connection with the intersecting motion. Also fixing the heckles and heckle-bars to these arms in such a manner that each line of the heckles, heckle-bars, and the arms above the joint, has a motion given to it varying from the circular motion that would have been imparted by the shafts on which the arms are placed; this motion being so applied that the heckles shall penetrate the flax at about right angles with the vertical line of the flax, and, as the arms attached to the shaft move forward, shall gradually fall backward, so as to keep at nearly the same angle through the body of the flax.—[*Inrolled in the Inrolment Office, March,* 1843.]

To JOHN BURNS SMITH, *of Manchester, in the county of Lancaster, cotton-spinner, for certain improvements in machines for preparing, carding, roving, and spinning, cotton and other fibrous substances.*—[Sealed 8th June, 1839.]

THIS invention consists, Firstly,—in an improved arrangement of mechanism, constituting a machine for preparing or opening cotton in the first process of cotton-spinning; Secondly,—in an improved carding-engine; Thirdly,—in an improved roving-frame regulator, for governing the winding of the slub or roving on the bobbins of such machinery to which the improvement is applied; Fourthly,—in an application to the spinning and doubling frames, by which the yarn becomes more smooth and solid, and may be sized, and adapted for manufacturing purposes. The manner in which the improvements are to be performed and carried into effect, will be more clearly seen by reference to the drawings in Plate XIV. Fig. 1, shews the improved mode of preparing cotton. *a, a,* and *b, b,* are two endless "grids," each composed of a series of consecutive flat iron bars *g, g,* with teeth *k, k,* and affixed or mounted as two endless chains. These grids are put into near contact with each other, and one is made to go quicker in surface motion than the other, the relative speed being modified as the cotton may require. A 1, is the fast-driving pulley of the machine, upon the shaft *i*, of which are keyed polygonal drums or cylinders *h, h*: similar drums are also keyed on the shafts *a* 1, *a* 2, *a* 3, round which drums are the two endless grids, which have continuous motions. *c*, is the hopper-formed mouth, which receives the cotton as taken from the cotton ball or mixing. In the hopper a saw-toothed roller *f, f,* is placed, for the purpose of feeding and holding the cotton until the rakes or teeth on the grid, *b, b,* take hold of it, and carry it to the point of contact of the other grid *a, a,* which is moving at a much quicker speed than the above grid *b, b,* and discharges or delivers it at the opposite end *d*, by which means the cotton receives an opening, raking, and teazing process, without sustaining any injury to the fibres, and may thence be taken to the next process of operation.

The second part of the invention is shewn at fig. 2, which represents the side elevation of an ordinary carding-engine, with the improvements applied thereto; the opposite elevation being the driving side, conveying motion from the axis A, to the doffing cylinder *a, a,* common to carding-engines in general, needs no illustration or explanation here. The improvements consist in a superior method of cleaning out from the carding-rollers of the carding-engine the loosened fibres, knots, motes, and earthy and vegetable matters which are embedded in the cotton in its original state. This is effected by means of a travelling and revolving brush *x*, which is mounted on a lengthened arm of the segmental tooth-rack *h, h,* which is suspended on the axis of the main cylinder A, of the carding-engine, and has respectively a reciprocating motion over the arc circumscribed by the periphery of the carding-rollers *a* 1. The revolving brush, having rotary motion on its own axis from the fast-driving pulley on the axis of the main cylinder, and by its reciprocation or oscillation moves over the arc formed by the rollers, and being in close contact with their card-surface, keeps them perfectly clean from all loosened fibres, dirt, and vegetable matter, and enables the carding-engine to produce a much greater quantity of work in a given time. By the application of this revolving brush, all the clearers used to clean the carding-rollers of carding-engines may be dispensed with, which will allow of more carding-rollers being employed, as the reciprocating and travelling motion of the brush will answer the purpose of clearer or cleaner for all the carding-rollers. In fig. 2, *a, a,* is the doffing cylinder, and upon its axle the spur wheel *a**, is fixed, which gears with and gives motion to the wheel B, attached to which is the bevil pinion *b*. This pinion gives motion to the bevil wheel C, fixed upon the horizontal shaft *d, d*. *e, e,* are the feeding-rollers. Upon the shaft *d, d,* are two bevil wheels *f, f,* capable of gearing with a larger bevil wheel *g*, behind which, and upon whose stud, is a small spur pinion, which gears into the segmental toothed rack *h, h*. Between the two bevil wheels *f, f,* is a double catch or clutch box *i, i,* protected by a midfeather on the shaft *d*. On the segmental rack *h, h,* are two adjustable studs *k, k,* that come repeatedly and alternately into contact with the small suspended double-armed or pronged lever *l*, (see fig. 4,) and, by acting upon the said lever, put into gear the clutch of each of the two bevils *f, f,* respectively and repeatedly, and keep up a constant reciprocation and oscillation of the segmental rack and brush clearer. On the opposite side of the engine, the support for the brush is only a plain arm, suspended on the axle of the main cylinder, and in order to keep the brush clean, a tin cover or casement is made to circumscribe it, and secured to the lengthened arm of the segmental rack *h, h,* (fig. 3); the one edge *s*, being a metallic toothed comb, and set in close contact with the brush, keeps the brush clean from the gathered loose fibres of cotton, &c. The refuse of loosened fibres, &c., being arrested from the brush, are immediately gathered by the next coming roller, and are again carried to the main cylinder and rollers, and so on continuously. Where it may be advisable to retain the refuse of loosened fibres, knots, and motes, the metallic comb *c*, (fig. 2,) is employed: it is affixed to the lever *p*, at *o*. The teeth of the comb facing the brush receive all the loosened fibres, knots, and motes, &c., and in order to keep the comb clear, there is, projecting from the fixing *e,* (which fixing forms a part of the casement,) a smooth fixed plate *i,* with an angular edge, the length of the comb, and which is cut at its edge with small recesses, each to receive a tooth of the comb; and the lever supporting the comb, having an ascending and descending motion, keeps the comb clean from the gathered loose fibres, &c., which fall, and are retained in the chamber *z,* until it is full; they are then taken away by opening the door *w, w.* The lever *p,* is secured to a shaft which goes through the fixings *e,* at either end of the brush, having a similar lever at the other end, and in order to clean the toothed edge *s,* a smooth plate *r,* having an angular edge, is applied. This angular edge is cut with recesses for each tooth of the comb *s,* to fit in, and, being secured to the lever *p,* it has, with it, an ascending and descending motion, that keeps the comb *s,* clean. The ascending and descending motion of the lever *p,* is thus obtained:—Upon the entire length of the arc that supports the carding-rollers, is a stationary toothed segmental rack *y,* (see fig. 3,) and on the lengthened arm that supports the brush *x,* is a stud, carrying a wheel *q,* which gears into the fixed rack *y.* Now, by the lengthened arm moving over the rack *y,* the wheel *q,* receives a rotary motion, which it imparts to a wheel *t,* mounted loosely on the shaft of the brush *x,* and having attached to it a cam or excentric *u,* which gives the ascending or descending motion to the lever *p.* Over the entire periphery of the main cylinder, circumscribed by the acting rollers, a sheet iron guard or covering is applied: it is set near to the surface of the main cylinder, but so as not to touch it. This metal covering is secured to the circular arcs which support the carding-rollers on each side of the carding-engine, and there are parallel recesses or openings cut into it, that each roller may approach and be set to its place of contact with the main cylinder. By means of this guard or covering, much of the loose carded cotton will be prevented from flying off the main cylinder by its centrifugal force, and the carding-engine will be kept much cleaner.

The improvements in roving machinery will be seen by referring to fig. 5. *a, a,* is a parabolic screw; *b,* is a nut, furnished with a steel pin, which works in the groove of the screw. The nut *b,* has two projecting studs *c, c,* which are placed in the fixed slides *f, f,* that are secured to the framing on each side of the nut. Upon the studs of the nut are two parallel rods *d, d,* which are affixed and secured to a swivel collar on the end of the cone, drum, or expanding pulley, so that the cone may be governed, and vary its place of rotation, from the position of the nut *b.* On the end of the screw is a small pinion *e,* gearing into a larger wheel *s,* upon whose stud is a ratchet-wheel *g,* a tooth of which is gathered by every ascending and descending of the bobbin rail, in the ordinary manner common to slubbing and roving machinery. Every tooth of the ratchet wheel *g,* which is gathered, will impart from the wheel *s,* a portion of a rotation to the pinion *e,* and screw *a.* Now it will be seen, that every part-rotation of the screw diminishes the distance that the nut travels along the screw, and with the nut the cone, through a parabolic series of changes, which are required by the growing diameter of the bobbins which the screw *a,* governs, and may be divided as required to the most minute series of shifts or distances, by changing the pinion *e,* or wheel *s.*

The last improvement consists in an application to the throstle, doubling, and mule frame, which will be seen by reference to fig. 6. *a, a, a,* are the drawing and delivering rollers common to all spinning machinery; *b,* is the spindle of the throstle frame; *c,* is the bobbin which receives the yarn while spinning; *d,* is the guide wire for guiding the yarn or thread to the flyer *e,* which twists the yarn or thread by its being affixed on the spindle *b,* which receives its motion in the ordinary way. The improvement consists in placing a trough, shewn in section at *v,* a little below and in front of the delivering rollers *a, a,* and extending the entire length of the same. This trough contains either water or thin size, and in it a small smooth copper roller *w,* is mounted, which revolves upon suitable bearings, in an opposite direction to the front or delivering rollers *a, a.* The yarn shewn at *x, x,* in passing from the front or delivering rollers to the spindles and bobbins, is slightly pressed on the periphery of the small copper roller *w*, which, revolving in the water or size, carries a certain portion on its surface, and thereby damps or wets the yarn which is passing over it. By this means the loose outward fibres of the yarn are laid, whilst undergoing the operation of twisting or spinning; and by combining the said loose fibres, a more smooth and solid thread of yarn is made, thereby rendering it more suitable for manufacturing purposes. When thin size is used, a steam-heated smooth pipe should be applied to the winding-frame, of its entire length, so that the yarn in winding may press upon it, and become dry for the purpose of warping. The patentee states, that it is desirable to place the roller *w*, as near to the front or delivering rollers as possible, that the twist may not be retarded from being uniformly distributed over the yarn: he has likewise found, that a moderately quick motion being given to the roller *w*, assists the twist in the yarn to ascend to the point of delivery of the delivering rollers *a*, *a*, and also more freely wets or damps the yarn in passing. The surface motion of the roller *w*, may be nearly the same as the delivering rollers. With respect to the mule-spinning frame, the yarn delivered by the front rollers being at different angles from the delivering rollers to the spindles, caused by the receding of the spindles from the front rollers, in order that the yarn may be always in contact with the roller *w*, the patentee proposes applying an ascending and descending movement to the trough and roller, to suit the varying angle of the yarn, so that it may always be in contact at one pressure upon the roller *w*. But, for more simplicity of construction and adaptation, the yarn delivered from the front or delivering rollers may be carried forward by the receding spindles, in a horizontal direction from the point of delivery of the front rollers, the length of the stretch or draw of the mule.

The patentee claims, Firstly,—the arrangements of mechanism constituting the two endless toothed grids, revolving at dissimilar speeds, for the purpose of raking or opening cotton. Secondly,—the travelling or reciprocating motion of the brush over the arc formed by the rollers, and which, being in close contact with their periphery, keeps them clean, and is used as a general clearer. Also, the adaptation and manner of effecting the reciprocation of the brush; and the adaptation and manner of effecting the movements for cleaning the comb; together with the sheet-iron guard or covering circumscribing the part of the cylinder formed by the arc of the rollers, to prevent the cotton from flying off the main cylinder by its centrifugal force. Thirdly,—the application and adaptation of the parabolic screw for governing and effecting the more minute series of changes required in the speed of the bobbins, in the slubbing and roving frames, to which it is applied; and Lastly,—the application and adaptation of the roller *w*, for the yarn to press upon, and revolving in an opposite direction to the front or delivering rollers, in a trough containing water or size.—[*Inrolled in the Petty Bag Office, December*, 1843.]

To Thomas Thompson, *of Coventry, in the county of Warwick, weaver and machinist, for his invention of certain improvements in weaving figured fabrics.*—[Sealed 28th December, 1842.]

These improvements in weaving figured fabrics apply to those particular kinds of fabric which have a terry or raised looped surface, such as coach lace, Brussels carpeting, velvet, and other woven goods having terry or raised surfaces, either plain or figured; and consist in certain means of introducing, and withdrawing, the wires or tags, upon which the terry loops are formed, by means of machinery in conjunction with the ordinary operations of the loom. The tags or wires are severally attached to moveable arms, which by suitable arrangements of mechanism are made to advance, and to be slidden laterally in between the warp threads when the sheds have been opened; and are in like manner withdrawn from the work after the terry loops have been formed upon them, and by the course of weaving made fast. Two of these moveable arms are to be employed, one mounted on either side of the work, near the selvage, and each carrying a tag or wire fixed in its inner side; the two wires extending horizontally, in opposite directions, towards the work, and sufficiently long to reach through the breadth of the warps. One of these wires or tags having been placed between the open sheds of the warp, as above said, and the terry loops formed thereon in the ordinary mode of weaving, the work must be properly secured by subsequent shoots and beating up, and then another tag or wire introduced in a similar way, and the work secured in like manner. This being done, a lateral movement is given to the first-mentioned arm, by which the tag or wire is drawn sideways out of the work. The arm is then advanced, and when so advanced, is moved laterally inward, so as to place the tag or wire again between the open sheds of the warp, ready to have the terry loops formed upon it by the usual evolutions of the loom; and after that has been effected, the other arm is moved in a similar way, and the work continued by a succession of the like movements.

These operations of the arms, carrying the terry wires or tags, will be better understood by reference to the drawings in Plate XV., which represent parts of a loom for weaving coach lace, having the improvements appended thereto. Fig. 1, is a partial front elevation of the loom; fig. 2, is a vertical section, taken transversely through the middle of the loom, at a right angle to the front; and fig. 3, is a horizontal view of the loom, taken a little above the level of the breast beam. A, A, are the end standards and the framing; B, the breast beam; C, the batten, carrying the reeds and shuttles; D, D, the ground warps; E, E, the terry warps; and F, the work roller. Fig. 4, represents the forms and positions of a pair of these moveable arms, placed by the selvages of the work, each arm carrying the tag or wire. This figure may be considered as a detached portion of the loom, seen in a horizontal view, as at fig. 3, but drawn upon an enlarged scale, for the purpose of shewing the construction of the parts, and their modes of working, more clearly. Fig. 5, is a sectional elevation of the same arms, with their appendages, upon an enlarged scale, in the positions shewn at fig. 2; and fig. 6, is a front view of the two arms, as seen at fig. 1, also upon an enlarged scale.

The arms *a, a,* sliding in and out in sockets, each carry a tag or wire *b,* at its end, which wire or tag may be secured into the arm by a clip and screw, as shewn, or by any other convenient means. The sockets *c,* in which the arm slides, are affixed to a plate *d,* forming a carriage for the arm; the plate of the carriage of one arm being made fast to the under side of a horizontal rail *e,* and the plate of the carriage of the other arm to the upper side of another horizontal rail *f.* These two rails, *e,* and *f,* extend along the front part of the loom, between the breast beam B, and the batten C, and parallel to both, as shewn in figs. 1, and 2. The horizontal rails *e,* and *f,* respectively bear upon rollers *g, g,* turning in the standards *h, h,* by which they are enabled to slide laterally to and fro upon the rollers, as seen in figs. 1, and 2; and the carriages of the arms, being made fast to the rails, are, by the sliding of the rails, occasionally brought into the situations represented by dots at a^1, and a^2, in fig. 3. The alternating lateral movements of the horizontal rails *e,* and *f,* are effected by the action of studs *i, i,* on the ends of angular levers *k,* and *l,* which turn on fulcrum pins in brackets fixed to the end frame of the loom. One arm of each of these angular levers *k,* and *l,* is, by a cord *m,* or *n,* (extending upwards,) connected with the movements of the mounture of the Jacquard. When the cord *m,* is drawn up, the longer arm of the lever *k,* will rise, and the stud *i,* on the other arm of the lever be made to act against a tooth *p,* pendant from the upper horizontal rail *e,* as seen in fig. 1, and by so doing will cause the rail *e,* to slide towards the right hand, and thereby draw the carriages *d,* and arms *a,* into the situations shewn, for example, by dots at a^1, in fig. 3, by which the tag or wire *b,* whereon the terry loops have been formed, will be drawn out of the work on the right-hand side of the selvage. A movement, to be presently explained, will then project the arm *a,* forward, carrying the tag or wire *b,* opposite to the open sheds of the warp. The longer arm of the lever *k,* still rising, will cause the stud *i,* to escape past the tooth *p,* when a weighted cord *q,* at the left-hand end of the loom, immediately draws back the horizontal rail *e,* in that direction, into the position shewn at figs. 1, and 3; by which means the advanced tag or wire *b,* will be projected between the open sheds of the warp on the right-hand side of the selvage, ready for the terry to be woven upon it. The tension of the cord *m,* being then relaxed by the descent of the mounture, the lever *k,* will fall back by its own gravity (the pendant tooth *p,* which hangs upon a joint-pin, allowing the bolt *i,* to pass), into the situation shewn in the last-mentioned figure.

In a similar way the cord *n,* being drawn up by the rising of the mounture, the other angular lever *l,* at the opposite end of the loom, will cause its bolt or stud *i,* to act against the pendant tooth *p,* of the horizontal rail *f,* and slide that rail laterally toward the left-hand, by which the carriages *d,* attached to that rail, with their arms *a,* and the tags or wires *b,* extending from them, will be withdrawn from the work on the left-side of the selvage. The arms *a,* being then advanced into the situation shewn by dots at a^2, (by the means about to be explained), on the escape of the bolt *i,* past the tooth *p,* the horizontal rail *f,* will, by its weighted cord *r,* be immediately drawn toward the right-hand, into the position shewn in figs. 1, and 3; and the arms *a,* being thereby moved laterally toward the right-hand, the wires or tags *b,* by those means, will be again introduced between the open sheds of the warp, ready to form the terry loops of the next course, by the subsequent evolutions of the loom.

It is now necessary to explain the means by which the arms *a,* are moved forward, when the tags or wires are drawn out of the work, which will be best understood by reference to the enlarged figures 4, 5, and 6. To the hinder part of each of the plates *d,* of the carriages, affixed to the horizontal rail *e,* a weighted cord *s,* is attached, which cord passes over a pulley *t,* inserted into a mortise hole in the back end of the arms *a.* This cord passes also over another pulley *u,* attached to the lower part of the back socket *c,* and, by the draft or tension of the weighted cord *s,* a pressure will be always operating at the back end of the arm, to force or project the arm *a,* forward. The arm *a,* therefore, having been moved laterally, and the tag or wire drawn out of the work, it will be immediately sent forward by the pressure of the weighted cord *s,* into an advanced position, as a^2, in fig. 3.

It will be necessary here to notice, that the arms *a,* are slightly bent upwards, and that in each of the back sockets *c,* there is a swivel-box *z,* turning on pivots, through which swivel-box *z,* the arm *a,* slides, and by it is guided, in order to raise, as it advances, the end of the arm, and the tag or wire *b,* to a level with the open sheds of the warp. When this has been done, the lateral movement of the horizontal rail *e,* in the opposite direction to that last described, will then place the tag or wire *b,* between the open sheds of the warp, and the subsequent beating-up operation of the batten and reed will drive back the tag or wire *b,* home into the work to form the terry loops; the tension of the weighted cord *s,* giving way to the pressure of the reed and batten, and allowing the arm *a,* to recede. By similar means, weighted cords *v,* being made fast to the upper parts of the back sockets *c,* of the horizontal rail *f,* and the cord *v,* passed over a pulley *t,* in each of the arms *a,* connected to the rail *f,* the same projections of those arms will take place after their tags or wires have been withdrawn from the work; and by the means described, the tags or wires will be again inserted into the open sheds of the warp, and brought back into the work by the operation of the batten.

In order to withdraw the pressure of the weighted cords *s,* and *v,* from the ends of the arms *a,* whilst the tags or wires *b,* are in the work, there is provided a flap or moveable shelf *w, w,* (seen in figs. 1, 2, and 3,) which turns upon pivots in standards *j, j,* fixed to the frame of the loom. This shelf *w,* is weighted at its back upper edge with blocks of lead, as seen at *x,* in fig. 3, and is held in an inclined position, as seen in the figures, by a cord or cords *y,* connected with the mounture; but when the pressure or tension of the weighted cords *s,* or *v,* is required to be taken off the ends of the sliding arms *a,* then the draft of the cords *y,* is relaxed, and the shelf is allowed, by the gravity of the weights *x, x, x,* to be brought into a horizontal position, which causes the shelf to lift the weights of the cords *s,* or *v*; and this takes place at the time that the tags or wires are in the work; but as soon as the tags or wires are withdrawn from the work, the shelf is made to assume the inclined position again, in order that the weights may act upon the cords *s*, or *v*, and project the arms forward, as above described.

The patentee states, that he does not confine himself to the production of narrow goods, as this improved means of weaving may be also adapted to the production of carpets and other terry goods having raised or looped surfaces; neither does he limit himself to the precise mechanism above described, for working the arms that carry the tags or terry wires, as their required movements may be effected by a variety of means.—But he claims the weaving of terry fabrics, by means of tags or wires, attached, or affixed to, or inserted into moveable arms, mounted by the sides of the selvages; such arms being shifted at intervals by the agency of suitable machinery (as a substitute for manual labour), and made to introduce the wires or tags into the open sheds of the warp, and to hold them in the warp during the formation of the terry loops; and also to draw them out of the work after the terry loops have been formed and secured by the ordinary evolutions of the loom.—[*Inrolled in the Petty Bag Office, June*, 1843.]

Specification drawn by Messrs. Newton and Son.

To John George Briggs, *of Leicester, in the county of Leicester, coach proprietor, for certain improvements in axles.*—[Sealed 5th October, 1843.]

This invention consists in forming railway and other axles by inserting a solid axle or shaft within a hollow one.

In Plate XV., fig. 1, exhibits a longitudinal section of part of the improved axle, applied to a railway carriage-wheel, also in section; *a*, is the hollow axle secured to the wheel by a key *b*, and containing the solid axle *c*, which is fixed in it by a key *d*. Upon the end of the axle *c*, a journal *e*, is formed, but, if preferred, the hollow axle may be continued to the end of the solid one, as shewn in the section, fig. 2, and the journal formed upon it. If the bearings are required to be inside the wheels, then the hollow shaft must be cut away to form the journal; or, if preferred, a couple of collars can be welded upon it, as represented by the dotted lines *f*, *f*.

The claim made by the patentee is, the construction of axles by combining together solid and hollow shafts, one within the other, in the manner above described.—[*Inrolled in the Inrolment Office, April,* 1844.]

To WILLIAM ROWAN, *of the firm of* JOHN ROWAN AND SONS, *of the Doagh Foundry, in the county of Antrim, engineer, for certain improvements in axles.*—[Sealed 7th November, 1843.]

THIS invention consists in the application to railway and other axles, of anti-friction rollers with bevilled or rounded ends, in the manner represented in Plate XV., for the purpose of lessening the resistance offered by friction to the rotation of the axles. Fig. 1, is a vertical section, and fig. 2, a horizontal section of the box or bush that surrounds the rollers and axle. *a*, is part of the axle; *b*, the anti-friction rollers, four in number, (but a greater or less number may be used,) the axles of which are carried by two rings *c*; these rollers revolve in contact with the axle, and with the interior of the box *d*, and are prevented from moving laterally by their bevilled ends working against corresponding bevilled parts on the axle and box, the screw-cap *e*, nut *f*, and the plate *g*, that covers the front of the box. The box *d*, is connected to the bearing *h*, affixed to the underside of the carriage-framing, and on the top of it one of the carriage springs is fastened.

The patentee claims "the application of friction-cylinders or wheels to axles, in the particular manner before described, that is to say, the application to axles of friction cylinders or wheels, with bevilled or rounded ends, mounted or fixed in a carrier which fits loosely upon the axle, and revolves, as well as the friction-wheels, round the axle; and which carrier and friction-wheels are kept in their places on the axle by means of bevilled parts on the axle and bush, at one end, and of a screw-cap and a nut at the other, or by any other equivalent contrivances."—[*Inrolled in the Inrolment Office, May,* 1844.]

To William Newton, *of the Office for Patents*, 66, *Chancery-lane, in the county of Middlesex, civil engineer, for an invention of certain improvements in the preparation of paper designed for bank notes, Government documents, bills, cheques, deeds, and other purposes, wherein protection and safety from forgeries or counterfeits are required,—being a communication.*—[Sealed 10th June, 1843.]

These improvements (communicated to the patentee by a foreigner residing abroad) consist in covering both sides of the paper used for bank notes, Government documents, bills, cheques, deeds, and other purposes, with designs arranged and printed in such a manner, that they can neither be imitated by hand nor through the agency of machinery, nor be transferred upon stone and then reproduced by any of the means known in lithography.

It is well known that stamped paper used for deeds may be washed, and used again for other deeds, the Government stamps being preserved unmutilated, and that part of the writing may be taken out, and other words substituted; also, that figures and indications of sums of monies may be altered by chemical processes, the stamp remaining entire, as well as the body of the document.

The designs printed on the surface of the paper, and on each side thereof, must be so organised as to render it impossible, Firstly,—to imitate the matrix plate from which the design is obtained; Secondly,—to trace or copy by hand all the elements or parts of the design with lithographic ink, for the purpose of transferring it upon stone; and, Thirdly,—to transfer the whole design upon lithographic stone, and from which proofs may be afterwards taken.

These results are said to be attained by the present improvements: the nature of the paper to be used, the designs to be employed, the mode of organising and engraving them, the printing of the same, and the nature of the inks, are thus described:—

The paper used for deeds and documents of all kinds must be of a durable quality. Two sorts of paper are manufactured, one called "hand-made," and the other "machine-made" paper. The manufacturer of machine-made paper cannot conveniently use pulp pounded by mallets or beaters, as is the case for paper made by hand; the fibres of such pulp being too long to drain on the endless wire cloth. From hence arises the necessity of using grinding cylinders of great power, in order to convert the rags into a very fine pulp, and, as a necessary consequence, the machine-made paper is of a finer quality, but not so strong as the hand-made paper.

The papers made from pulp which has been bleached by chlorine, ought not to be used for making a safety paper; for the chlorine weakens the pulp, and opposes obstacles almost insurmountable, to the making of the safety paper. When manufactured in this manner, however carefully made, the paper will always retain certain chemical agents, which, after a time, may act upon, and eventually destroy, the vegetable substances used for coloring the inks. It is, therefore, of the utmost importance, in the production of safety paper, to employ that only which is manufactured by hand, with rags naturally white, and not bleached by chlorine. This observation has only for its object the production of a paper of the greatest possible durability, and not containing any chemical agents likely to attack the ink; but the improved method of preparing paper for all the purposes above mentioned, may be applied to continuous or machine-made paper, in the same way as to paper made by hand.

With respect to the engraved designs, it is not sufficient that they should be difficult or impossible to copy; it is also necessary that any falsification may be easily detected, and that the subscriber of a promissory note, the drawer of a bill of exchange, or any one else, should be able, at a simple inspection of the documents, to ascertain whether the design has or has not been reproduced by hand at the place where the amount of money is generally written, without being under the necessity of bringing another bill to compare with it.

The design must therefore be composed of regular parts, easily perceptible and recognizable by the naked eye; but it is essential that the "type figure" or device be geometrically regular, and present a distinctness in the lines, and a great symmetry in the disposition of its constituent parts. In its composition there should be no straight lines, because they are too easily made with a rule, nor any curve which may be traced at once by compasses. The imitation of this regular element must present insurmountable obstacles to forgers.

These regular elements are to be distributed symmetrically on the whole surface of the sheet of paper, and must be repeated a great number of times, to offer a great number of points of comparison.

What has been stated with reference to one of the regular elements, taken individually, applies equally to the whole of the elements constituting the design. It is therefore indispensable, in order that these regular elements may be inimitable by hand, that they should be distributed on the surface of the paper with a mathematical precision, so as to offer a uniform tint. They are consequently to be engraved and distributed on the surface of a matrix plate, in steel or other metal, or on stone, by the agency of a machine. A regular element of design must therefore be mechanically produced, and repeated identically and at regular intervals on a given surface, so that the most skilful hand, assisted by the keenest sight and the most obstinate patience, would find it impossible to reproduce one of those elements, if it were obliterated.

The same impossibility would exist with reference to any attempt made to charge the whole of the lines constituting the regular element with lithographic ink, in order to transfer them on to stone, and strike off proofs from the same.

A design produced in the same manner as above described, although it could not be imitated by hand, might be copied by mechanical means, and as a guarantee against that contingency the inventor has recourse to the following contrivance:—

The spaces left between the regular elements, are filled up by a design of a different aspect, but no confusion with the regular elements must take place; and, moreover, this design, as an indispensable condition, is produced by chance, so that it is impossible to obtain two similar drawings by using the same or any other means; the latter design is microscopic, that is to say, the elements constituting it can only be properly seen by means of a magnifying glass. This second design, produced by accident and not imitable, has for its object to render the counterfeit of the matrix plate impossible, and also stamped papers, which have been written upon, being washed, in order to produce another design upon them.

The organisation of the designs is thus described by the inventor:—A matrix composed of regular elements in the conditions above stated is to be engraved by means of a point and a suitable engraving machine. This design may be engraved or marked on a lithographic stone, or on a plate of metal, or even on a block of wood, but a steel plate is preferable, as this description of work requires great precision. A proof is taken from this plate in the ordinary manner of copper-plate printing, and transferred on to a lithographic stone by the means usually employed by lithographers. The transfer being thus made, a coating of gum arabic dissolved in water and slightly colored (or any other substance soluble in water) is applied to all the regular elements constituting the design transferred on the stone. This coating, which is not spread over the intermediate spaces left between the regular elements of the design, is allowed to dry. Then a second drawing is transferred on to the whole of the same stone; this latter drawing being composed of irregular elements, much smaller than the regular elements of the first drawing, and which may be microscopic. It will be understood, that the regular elements being protected by the gum covering, and the intermediate spaces alone being left bare, it is only on the latter parts that the stone will receive the second drawing. This drawing is previously to be made on a sheet of metal or stone, or even on wood. It may be etched and engraved, either by the hand, by machinery, or by a chemical process; but, whether made on a metal plate, on stone, or by a typographic operation, it must necessarily be obtained by chance, so that it cannot be reproduced, either by the process that effected it, by any other process, or by the hand of an artist.

In order to attain this result, take resin or colophony, in powder of a middling fineness, and sift it on to a lithographic stone, previously heated. When the grains or atoms of resin are fixed by the heat, the stone must be corroded by a solution of nitric acid, and thus an irregular ground is obtained. The size of the grains of resin, the degree of heat necessary to be given to the stone in order to fix the said grains, as well as the acid employed for the corrosion, must vary according to the results to be obtained.

An irregular ground may also be made on a lithographic stone by taking a brush with short hairs or bristles, dipping this brush in thickened lithographic ink, and striking gently and irregularly on the surface of the stone with the extremity of the brush; the ink thus laid on the stone is to be fixed by the ordinary process. Also, a lithographic stone may be covered with lithographic ink, which is allowed to dry; then, on the whole of the blackened surface, an engraver's roller is to be rolled irregularly, to obtain white points on a black ground. The above are only a few of the many modes which may be employed to produce an irregular ground.

It must be understood, that the owner of this plate may take proofs from the same, and transfer them on to stone; that he may take casts from it, and cause it to be reproduced by the polytype and electrotype process, but neither the author himself, nor any other person, could make a second plate identical with the first, except by some of the above means of multiplication.

The irregular ground being obtained by one of the modes above stated, or by some mode equivalent, a proof is taken from the plate, and transferred on to the lithographic stone, which has received the regular drawing as above stated.

When the transfer is made, and fixed on the stone, the gum, by which the regular elements have been covered, is removed, and from it lithographic impressions can be taken, in which may be distinguished, by the naked eye, the regular elements surrounded, but not covered, by irregular and microscopic elements.

Instead of composing the matrix plate by transfers taken from two separate plates, this object may be effected by executing on the same plate on which the regular design has been already engraved, by any of the means above indicated, or by any other appropriate mode, the irregular design forming the ground, so as to obtain a matrix plate without transfer. From this plate, twenty or a greater number of plates should be produced, in order to guard against any accident which might happen to the original. These plates, which the inventor terms *seconds*, are obtained by taking proofs from the first plate, transferring them on to stone, and fixing them thereon. From the seconds, impressions may be taken, *ad infinitum*; these proofs may be transferred on to lithographic stone, the lineaments are brought up in relievo by the ordinary process of engraving upon stone, and then the impression may be introduced by the typographic press.

Having now described the improved mode of producing the visible design, which cannot be imitated, either by hand or by machinery, the inventor proceeds to state his method of preventing any impression of these drawings from being transferred on to stone, and afterwards multiplied at will.

This is effected by the employment of peculiar inks, which are preferred to be delible, and made with a mixture of oil, gum, or resin, because they are more easily employed in typographical impressions. The ingredients and process of mixing are as follows:—First, make a certain quantity of white ink, composed of balm of capahu, Venetian turpentine and chalk previously washed and dried; and grind these substances together until they are brought to the consistency of ordinary printing ink; this ink is called No. 1. Take one-half of it and set it aside, and in the other half introduce a sufficient quantity of ordinary ink reduced to powder by evaporation; this must be done in order to give the necessary coloring, that the design to be printed with this ink may be visible to the naked eye, and at the same time, that the writings made on the prepared paper may be perfectly apparent. This second sort of ink is called No. 2.

Instead of dried ink for coloring the ink, No. 2, any other coloring substance may be used, which is equally delible as common ink powder, in order that any attempts to extract part of the writing formed on the paper, may cause the extraction or obliteration of the visible design printed on the paper with this delible ink.

An impression is made on both sides of the paper with ink No. 1: old plates and those which are defective, may be used for taking this first impression, which not being visible, need not be made with plates free from defects.

The visible design is then printed with ink No. 2. This latter impression is made from a lithographic stone, or engraved or prepared with great care, and after these two impressions, the paper is dried, pressed, and cut for use.

A very good ink for printing the visible design may be made as follows:—

1.	Chalk, well washed............	20 to 25 parts.
2.	Common ink reduced to powder, or by preference gallate of iron ..	4 „
3.	Ultramarine blue	1 „
	Varnish *(quant. suff.)*	

This varnish, as well as the one above stated, is composed with equal parts of balm of Copahu and Venetian turpentine, melted together, and to be used when cold.

The results of the new combination of inks, and of the double impression, are thus stated:—If a forger attempts to extract a word, a sentence, or any quantity of writing formed on the safety paper, he will begin by using chlorine: this agent will destroy the color of the writing, and that of the visible impression, the coloring principle of ink No. 2, being the same as that of ordinary ink. He will then use an acid, to remove the oxide of iron, which will still leave traces on the place of each letter, and each lineament of the visible design, which traces cannot be obliterated by chlorine. In this second operation, the acid will have destroyed also the chalk contained in ink No. 1, and ink No. 2. The safety paper, thus treated, will retain at the spot obliterated only the slight marks produced in the substance of the paper by the pressure of the two impressions and the resinous principles of the two inks employed, for no vestige will remain of the ink with which the writing was formed. But neither the slight marks left in the paper by the printing of the visible design, nor the vestiges left by the resinous varnish of ink No. 2, will be of any use to the forger in his attempt to reconstruct the design at the place obliterated; for the marks made by the printing of the visible and invisible designs, and the vestiges of the resinous principles left on the paper by the inks No. 1, and 2, will be so complicated, and so much worked into one another, that it will be impossible to retrace the pattern.

If, moreover, the conditions of the designs, or the principles upon which they are constructed, are referred to, the numerous points of comparison which the same piece of paper will naturally offer, the perfection of the part executed by machinery, the impossibility to imitate by hand or machinery the part executed by chance, every one will be convinced that the reconstruction of part of the design will be utterly impossible, and the reproduction of the design by a lithographic transfer, will be equally impossible. In fact, whatever be the process employed to transfer the design, on to stone, it will be impossible not to transfer the two designs together,—the visible and invisible one, as both are printed with a resinous ink, and the only substance which distinguishes the two printing inks, is a small quantity of dried ink powder, which can have no influence on the transfer, it being mixed with a resinous body, which is more readily transferred on to stone than itself.

By counter-proofing the design of the safety paper, a forger, instead of finding on the stone the design he expects, will find a surface perfectly black, or presenting a confusion produced by the instantaneous transfer of the two designs, which may be identical, but are not placed one over the other in their proper places.

It should be mentioned, that the receipts of inks, above given, are only for the sake of illustration, and that other combinations of appropriate ingredients might produce an analogous result.

The patentee claims the covering of paper intended for all the purposes indicated in the title of the patent, with two designs, composed of elements regular and irregular, and obtained by the means hereinbefore described; one of the designs being printed in visible ink, and the other in invisible ink, both these printings being delible; by employing which means, it will be found impossible to reconstruct the design, of which part has been extracted by chemical agents, and equally impossible to transfer the whole design on to stone, in order to multiply it at will by impressions taken therefrom; and thus a complete guarantee is given to Government, to trade, and all private transactions.—[*Inrolled in the Rolls Chapel Office, December*, 1843.]

Specification drawn by Messrs. Newton and Son.

To Octavius Dillingham Mordaunt, *of Clifford-street, Bond-street, in the county of Middlesex, Gent., for improvements in apparatus for obtaining the profile of various forms or figures,—being a communication.*—[Sealed 21st November, 1843.]

The improved apparatus, for which this patent has been obtained, is to be used for copying or taking the profile of mouldings, cornices, and similar figures, and is represented in Plate XV., at figs. 1, and 2; fig. 1, being a plan, and fig. 2, an edge or side view thereof. It consists of a frame, composed of two bars, *b*, *c*, connected together by two bolts and screw-nuts *d*, *d*; this frame contains a number of thin sliders *a*, which are capable of sliding freely therein, and are kept sufficiently close together by filling-pieces *e*, *e*, of exactly the same length and depth as the sliders *a*, but considerably thicker.

In using this apparatus, the sliders are applied to the moulding or cornice, as seen at *f*, in fig. 1, and, being pressed against it, they recede more or less, according to the degree of projection of the part opposite the end of each slider; they are then retained in that position by turning the nuts *d*, *d*, and so bringing the bars *b*, *c*, (which have surfaces of leather *g*, *g*, at those parts where they press upon the sliders) closer together. A profile of the moulding may now be obtained, by laying the apparatus upon a sheet of paper, and moving a pencil thereon, against the ends of the sliders. A square, *h*, provided with a spirit-level *i*, is attached to the barb, by a bolt and screw-nut *j*, in order to get a vertical and horizontal line to work from, which is effected by moving the slide *k*, (shewn also at fig. 3,) with its pencil, along the vertical and horizontal bars of the square.

The patentee claims the mode of combining a series of sliding-pieces *a*, sliding in contact with each other, in a suitable frame *b*, *c*, as above described.*—[*Inrolled in the Inrolment Office, May*, 1844.]

To ARTHUR DUNN, *of Rotherhithe, in the county of Surrey, soap-boiler, for improvements in the manufacture of soap.* —[Sealed 9th November, 1843.]

THESE improvements in the manufacture of soap, consist in subjecting the mixture of oils or fatty matters with saponifying materials to the action of streams of air, forced below the surface thereof.

In carrying out this invention, the patentee fixes in the well of the soap copper, and just below the flange or joint, a tubular ring, of about one inch and a half bore, and perforated with numerous small holes; connecting it by a pipe, furnished with a stop-cock and union-joint, to any suitable blast apparatus for forcing atmospheric air into it.

The following description of the mode of making "a clean copper-yellow soap," will shew how the action of the air is to be regulated:—Into the copper (which is supposed to be capable of working 106 cwt. of materials) 360 gallons of lye, of specific gravity 1·14, are poured; the fire being then lighted, the copper is charged with grease, oil, or fatty matters, in the usual way (say about 83 cwt. of grease); and as soon as the lye is on the boil, or nearly so, the blast is set in action, keeping up a good brisk fire, so that the materials may continue as near the boiling point as possible. When the strength is taken up from the lye, more lye is added, until the grease is "killed;" and then an addition is made of

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* This is an application of an ingenious contrivance called "the physiognotype," which was patented in 1834 by Mr. Rettfort (see Vol. VI. p. 288, Conjoined Series), and used for taking copies of the human countenance in plaster of Paris.

23 cwt. of resin, by a few hundred-weights at a time, together with more lye, until 1200 gallons of lye have been used: the blast is kept in action the whole of the time, if the fire burns well; but if not, the blast is stopped for a short time, before adding the resin, to allow the materials to approach the boiling point. As soon as the whole of the resin is melted, and thoroughly incorporated with the soapy mass, and the strength of the lye taken up, the blast is stopped, and the contents of the copper, after being boiled up briskly, are allowed to stand, for the spent lye to settle; this lye is then pumped off, and the soap is finished or brought up to strength on fresh lye, as in the ordinary process of soap-boiling.

While the blast is in operation, the soap should be kept in "an open and grained state," which is effected by the addition of salt or brine. The lye, if of the strength above mentioned, should not be changed during the action of the blast; but if weak lye is used, one or more changes may be made. The soap should be kept in a weak state while the streams of air are acting upon it, as it would otherwise be apt to swell up, from the air hanging in the grain, and this is with difficulty got rid of by long boiling. When a charge is to be worked upon a "nigre," the patentee grains the nigre, and pumps off the spent lye in the usual way: he then adds the fresh charge, in the manner before mentioned; using less lye in proportion to the quantity and strength of the nigre, and taking care not to turn on the blast until there is sufficient grease present to make the nigre weak.

The patentee claims the improvements in the manufacture of soap by causing streams of air to be passed through and amongst oils and fatty matters, when combined, or together with suitable saponifying materials.—[*Inrolled in the Inrolment Office, May,* 1844.]

To Charles Maurice Elizee Sautter, *of Austin-Friars, London, Gent., for improvements in the manufacture of borax.*—[Sealed 22nd May, 1843.]

These improvements consist in producing, without the employment of water, an article possessing the same chemical properties as the crystallized borax now generally used, but having a different appearance, it being in a granular state, and, when pure, of a dull white color. The advantages stated to be derived from this invention are, a great saving in the cost of manufacturing borax, and also, a more ready application of the borax, so produced, to the making of glass, &c.

To manufacture this borax, take about 38 parts by weight of pure crystallized boracic acid, and sift it; then add about 45 parts by weight of fine crystallized carbonate of soda, reduced to powder, and mix them thoroughly together. When this is effected, place the mixture, in layers of about one inch thick, upon wooden shelves, arranged in a suitable apartment. The temperature of the room is then raised to from 90° to 115° Fahr., and the layers are occasionally raked. By keeping up the heat, the boracic acid and soda become combined, and the carbonic acid in the soda is driven off, together with the water contained in it. A perfect borax is thereby formed, containing all the chemical properties of the crystallized borax, without the aid of water. The time necessary for effecting this operation, will vary from twenty-four to thirty-six hours.

The patentee states, that impure acid may be also used for manufacturing borax after the improved mode, and although the result will not be so good an article as that made from the pure acid, yet it will not be objectionable for certain purposes to which it might be applied.—[*Inrolled in the Inrolment Office, November,* 1843.]

To ALFRED HOOPER NEVILL, *of Chichester Place, Gray's Inn Road, corn dealer, for improvements in preparing lentils and other matters for food.*—[Sealed 24th March, 1843.]

THE novelty of this invention consists in ridding lentils of their husks, in order to render them fit for human sustenance. The lentils are first washed and dried, and then split in the manner usually adopted for splitting peas; they are afterwards subjected to the operation of a winnowing machine, which drives off the husks, leaving the lentils in a state suitable for being used as a substitute for split peas. Flour produced from lentils cleansed in this manner, is proposed to be employed for thickening soups and making puddings, curry powder being added to the flour, in the proportion of one ounce of the former to four pounds of the latter, to give it a pleasant flavour. The patentee claims, Firstly, the manufacture of a product of lentils, separated from the husks, and thus rendered suitable for food for man. Secondly, the manufacture of flour from lentils, prepared as above described, and adding thereto a small quantity of curry powder.—[*Inrolled in the Inrolment Office, September,* 1843.]

To EDMUND SNELL, *of Bridge-road, Lambeth, in the county of Surrey, medical student, for improvements in the manufacture of soap.*—[Sealed 21st November, 1843.]

THIS invention consists in mixing with the saponified fats or oils, certain materials, prepared from potatoes and other vegetable matters containing farinaceous substances.

The method of preparing these materials from potatoes is as follows:—The potatoes, after being washed, are reduced to a pulp, in any suitable apparatus, from which the pulp is allowed to fall upon two inclined sieves or screens, having a slight horizontal motion. At the top, and midway down the upper sieve (which is covered with wire-cloth of thirty meshes to the inch,) are pipes, extending across the sieve, and perforated with numerous holes, from which water issues; the coarse parts of the potatoes are, by this means, separated from the finer parts, and discharged into a vat; while the finer parts pass through the upper sieve on to the lower one, (which has sixty meshes to the inch,) where a further separation takes place, the coarse parts descending into the vat, and the finer parts, which the patentee calls *dextrine,* falling on to an inclined plane of wood, placed beneath the lower sieve, but inclined in the opposite direction. The dextrine is conducted by the inclined plane into a vat, where it is repeatedly washed in sieves of finer wire-cloth, until deprived of all its impurities; it then sinks to the bottom of the vat, and may be taken up in pails, ready for use. The coarse part of the potatoes, termed *fibrine,* is washed in coarse sieves, and remains in a vat, covered with water, until it is wanted. If preferred, the dextrine may be dried, and kept until it is required for use; in this case, to each ton of saponified fat or oil, an addition is made of from 3 to 3½ cwt. of dextrine, which is first mixed with from 1 to 1½ cwt. of cold water, and, after standing for an hour, 6 cwt. of nearly boiling water are added; it is then mixed with the soap in the manner hereinafter mentioned.

White soap is made by the patentee from tallow or oil and alkali, in a boiler heated by a steam jacket, using as much alkali as the tallow or oil will take up; and when the soap is in a fit state "to cleanse into a frame," he takes, for each ton of saponified matter, from 4½ to 5 cwt. of dextrine, in its wet state, and adds thereto about 6 cwt. of boiling water, so as to make it into a thin paste. This paste, as soon as all the spent lye is pumped out of the boiler, is added to the soap, and, when properly mixed and heated, the soap may be cleansed into frames, in the usual way. Yellow soap is made in a common soap pan, with tallow or oil and alkali, and either with or without resin; after the soap is "fitted," it is heated in the boiler before mentioned, and the above quantity of dextrine is added, in the manner described. If no resin is put in the soap, a much larger quantity of dextrine may be used; and it may be added either with or without "fitting" the soap.

When fibrine is used in the manufacture of common soap, as much water is taken from it as will leave a thick body, which is then put into a boiler, heated by steam, together with an equal quantity of tallow or oil and resin; alkali is added in the usual way, and the whole is boiled until it is ready to be cleansed into frames.

Common soap, made in the ordinary manner, and containing a large quantity of alkali, may be re-melted, and dextrine added thereto, for the purpose of improving its color, and preventing it from wasting so fast in hot water as it would otherwise do.

In concluding the description of this invention, the patentee says, "What I claim as my invention is, First, the mode of manufacturing soap by combining therein the vegetable matters which I have called *dextrine* and *fibrine*, by mixing the same with saponified fats or oils, as herein described; and Secondly, I claim the obtaining *dextrine* and *fibrine*, to be used in the manufacture of soap, by means of the sieves, as herein described."—[*Inrolled in the Inrolment Office, May*, 1844.]

ON THE LAWS RELATING TO LETTERS PATENT FOR INVENTIONS.

No. XVI.

THE PATENT LAWS OF DENMARK.

It does not appear that any fundamental law, relating to patents for inventions, is in existence in Denmark; but as patents have often been, and continue to be, granted in this country for new inventions or discoveries, we have collected all the information connected with this subject which could be obtained. The following is a report, drawn up from the most authentic information, in answer to the inquiries made by us:—

Several authorities, among the legal profession at Copenhagen, have been consulted on this subject; manuscript records have also been consulted; and the joint result of these inquiries is, that no legal enactment whatever exists in Denmark relative to patents. But, although this statement is strictly correct, it has been presumed that, as patents are nevertheless frequently granted in this country, the British inventor might desire to know what is here substituted instead of law, or what has the force of law, and serves as a rule for the tribunals of the country when questions, relative to patents, are brought before them. The reply to the question put in this shape is found in a Danish work, whose title is: "*Qoartals Beretninger for Industriforeningen i Kiöbenhavn, redigerede af J. Wilkens: Forste Aargang;*" i. e. Quarterly Reports of the Industrial Association at Copenhagen, edited by J. Wilkens.—First Annual Series, page 263, seq. The passage here alluded to, forms an appendix to a paper "On Enactments in England and France, for securing the rights of property to inventors of patent drawings, together with an Appendix touching the state of things in Denmark on this respect." As the authorities consulted by us have pointed out this paper as the only source of information to be had on the subject, we shall here subjoin so much of the substance of the paper as has any bearing upon the question.

The author commences his Appendix by observing,—"that the preceding paper more particularly referred to pattern drawings for cotton prints in England and France, and then adds, that there is only one manufactory of any extent for cotton printing in the Danish dominions, together with a few manufactories of minor importance of the same kind; the author further observes, that hardly any collision can take place between these.

"A law of patents, however, is considered as a desideratum by the Danish lawyers, as appears from the circumstance that a motion on the subject was made in the provincial estates of Roskilde, in the year 1842, by Mr. Feddersen, one of the members of the Board of Customs. Although it does not appear that the Roskilde Assembly showed any great inclination to entertain the matter, Mr. Feddersen still succeeded in getting a Committee appointed and a Report framed. In the conclusion of the Report, the Committee states, "that a preparation and promulgation of a law of Patents would be a material improvement in our institutions; but that at the same time, the Committee find that the Estates have no occasion to enter into any further detail in this somewhat particular matter; and, therefore, the Committee beg leave to submit to the Honorable Assembly, that it should lay before his Majesty a petition to the effect, that the rules to be observed in the granting and obtaining of patents for industrial inventions, may be arranged by the promulgation of a law, a draft of which it is expected will be laid before the Assembly at the next session of the Estates." Now this next session will be convened, in regular course, next autumn, but we have no means of ascertaining whether any law of patents is among the bills which the government intends to submit to the deliberation of the provincial Estates of Roskilde. It will be observed, that some of the analogies, which in the absence of every written law, are proposed by Mr. Wilkens for the guidance of the judges, are rather far fetched: we will now proceed to extract the information contained in his Appendix.

"Neither is there any thing in the shape of legislation on the subjects of Patents for new inventions; as, however, Patents are granted from time to time, certain usages have been established with respect to them, which may be comprised in the following rules:—

"Patents are generally granted to natives as well as foreigners, for inventions and improvements, in as far as the latter are found to be suitable. A foreigner may obtain a patent in his own name, but he is required to carry out the patented improvement in this country either in person or by another. It is generally determined that the working of the patent, on pain of forfeiture of the privilege, shall be commenced within a twelvemonth from the date of the patent, and then subsequently continued.

"The patent is forfeited, if any person in this country can prove that he has worked the patented improvement in the same manner as the patentee. Disputed points are generally referred for decision to the tribunals of the country. The patent does not exclude the importation from abroad, and use of the article therein specified. In petitions for patents the inventor is required to state whatever is characteristic in his invention, in concise and definite terms, so that his own words may serve for insertion in the patent, to designate the article for which the patent is granted. He must also say whether he wishes the patent for Denmark, or for the Duchies of Holstein, Sleswig, and Lanenborg, or for all of these. The royal sanction having been obtained, previously to the patent being made out and laid before his Majesty for signature, the petitioner will have to send in to the Government Board, within a certain time, (which in each case is specified) an accurate drawing and description of the invention in duplicate, and both copies are to be signed by himself. One of these copies is annexed to the patent, the other is preserved with the Board, by which the patent has been issued, usually the Board of Customs, or the Board of Trade. Such drawings and descriptions are not communicated or shewn to any one. In certain cases, where individuals have made inquiry at the Board, as to the extent to which an existing patent might interfere with some business, begun or projected by them, the parties have been desired to describe their process, which being compared with the patented description, the Board has decided the question accordingly. The number of years for which a patent is granted, depends on the recommendation of the Board to his Majesty, the nature of the article being taken into consideration in such recommendations. The period desired by the petitioner is not always granted. Patents have been issued for terms varying from three to twenty years. The fees for a patent are 17 Rixbank dollars, when made out in the name of a single individual; but 34 Rixbank dollars, when two or more are concerned; no regard being had to the length of time during which it continues in force. It is not attended with any other expense. Renewal of the patent is not generally granted. A patent cannot be directly transferred to another; but when such an arrangement is desired, it is necessary for the patentee, and the purchaser, conjointly, to send in a petition for a new patent, to be made out in the name of the latter, for the remaining period of the privilege."

But although there is no law to protect the Danish inventor from the encroachments or infringements of others, on his right to his own invention, still there is no lack of legal provisions of an analogous nature, by which, in disputed cases, the tribunals might be guided in their decisions.

Thus, an ordinance of the 7th of January, 1741, for the protection of publishers and authors, provides, "that no person shall publish, reprint, or import reprints of, or offer for sale, any work that has been lawfully acquired by another; but that such work shall be the perpetual property of the latter, and no person, without his permission, shall be allowed to appropriate or reprint it, on penalty of confiscation of all the copies, and of other arbitrary amercements. From this, however, are excepted the psalm-books of the established church, Luther's catechism, primers, as also other books previously printed, the lawful owners of which are either deceased, or of which their heirs do not possess the copyright, or which the author or the original publisher, even if he be alive, has suffered to lie in abeyance, and not within the space of a year, six or three months, after the edition was out of print, (according to the size or expensiveness of the work,) again begun to publish; for, in such cases, the work may be freely published by another, it being presumed that the lawful proprietor has relinquished his copyright by the delay. The ordinance of the 7th of May likewise makes the above prohibition against reprints, as also the penalties which it inflicts, applicable with respect to works of which the subjects of foreign states may possess the copyright, in as far as there exists, or may in future exist in those states, a mutual prohibition against the reprinting of works published by his Danish Majesty's subjects."

For the protection of the right of artists, properly so called, to their productions, an ordinance was issued on the 13th of December, 1837, the substance of which is as follows:—"When a painter or sculptor causes his works to be reproduced by means of copper engravings, lithography, casting, or any other process which admits of the production of a great number of copies by means merely mechanical, then no other person shall be allowed for five, or by special grant ten, years from that time, to execute any imitation of that work, by any of the processes above-mentioned; the party shall, however, cause his determination of reserving his privilege to be duly advertised, and also apply to the print or imitation a stamp, having upon it his name, and the word "*Eneberettiget*," *i. e.* privileged. The privilege may be transferred to another by sale, inheritance, &c. The publisher of a copper-plate can also secure himself in the same manner against a counterfeit of the same form and size, by engraving or lithography. When circumstances plead in favor of it, the Board of Chancery can also grant to others, besides the artist, a privilege for the period of ten years, to reproduce a work of art by means of engraving, lithography, or casts. Trespassers on the monopoly shall make the injured party ample compensation, calculated, according to circumstances, to his greatest advantage, and be amerced besides in a fine of from 50 to 200 Rix-dollars, which fine however may be reduced to 20, when the trespasser has not made use of the proprietor's stamp, or the word "*Eneberettiget*," *i. e.* enjoying an exclusive privilege. All the copies which may be found in the possession of the trespasser himself, or may have been deposited with others for sale on his account, shall be confiscated; or, if such be the proprietor's desire, they shall be delivered up to him for his use, as his property, a suitable deduction being made for the same in the amount of damages. He who traffics in objects of art, which are counterfeited contrary to law, shall pay a fine of from 10 to 50 Rixbank dollars; he shall moreover, jointly with the counterfeiter, be liable in damages for the loss the party concerned may have sustained through the copies sold by him; and those copies which are found in his possession shall also be confiscated. If the party aggrieved neglects, within a year and a day (*i. e.* 53 weeks,) to prefer his claims, he shall have forfeited his right thereto."

Probably this very ordinance of 1837, in favour of artists, contains that *analogy*, as the Danish lawyers call it, which is most available to the judges when they are called upon to adjudicate questions of patents. However, it appears, that even remoter analogies are sometimes taken into consideration by the lawyers. Mr. Wilkens proceeds as follows:—"Lastly, the ordinance of 11th April, 1840, respecting penalties for theft, fraud, forgery, &c., contains a provision for the case of one manufacturer making use of another's name; still it is manifest, from the whole context, that no regard has been had to the loss which a manufacturer may suffer by another's use of his name, or of the designations he gives to his articles on sale, with the view of securing a portion of his custom; but only to the damage done to the public by such a proceeding; thus no compensation is given to that person whose name has been fraudulently used; for the 49th clause of the aforementioned ordinance, determines a penalty of from ten days' imprisonment, on bread and water, to four years hard labour, for every person who sells false or counterfeited goods, when this crime is perpetrated to any considerable extent. When the goods have been fraudulently provided with a stamp or mark of a manufacturer or tradesman, with the view of procuring custom and confidence by the use of his name, it shall be considered as an aggravating circumstance. Even though the goods be not of inferior quality to those counterfeited by the fraudulent stamp or mark, the above-mentioned proceeding shall be punished by fines, proportioned to the extent of sale, and other circumstances. As, on the one side, counterfeits which endanger the life and health of others, aggravate the punishment, even beyond the limits above stated, so on the other, adulterations of goods, occurring in the retail trade, which cause but a slight damage to any person, shall be visited with less severe penalties, such as fines of from 2 to 20 Rixbank dollars for the first offence; still the fine must never be less than double the amount of loss caused to others; the second offence is punished by heavier fines, according to the nature of the case,—forfeiture of citizenship, imprisonment or incarceration on bread and water; by the third offence, the privileges of a citizen are inevitably forfeited."

Mr. Wilkens further adds, that in his judgment the Danish iron-founders appear to be entitled to particular protection for their patent drawings, inasmuch as they frequently must be at considerable expense in procuring the models and designs for stoves he mentions as instances; and, in order to secure the protection of the law, and more particularly of the ordinance of 17th December, 1837, above mentioned, he recommends to the owners to provide their articles with a stamp, bearing their name and the word "*Eneberettiget,*" *i. e.* enjoying an exclusive privilege.

The result of the whole is, that the question of patents has not hitherto been considered in all its bearings in Denmark. The Danes, it has been repeatedly averred by their ablest writers and statesmen, are not a manufacturing people, of which the natural consequence is, that the laws and regulations relative to that department, are only in a state of infancy among them, and of this the above quotations afford the clearest evidence.

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from p. 297.)

February 13, 1844.

George Rennie in the Chair.

"Account of some experiments on a vessel called the 'Liverpool Screw,' fitted with Grantham's engines and Woodcroft's screw propeller."

The "Liverpool Screw," upon which the experiments described in this paper were tried, is a small iron vessel, 65 feet long by 12 feet 6 inches beam, and 3 feet 9 inches draught of water. She is propelled by two high-pressure oscillating engines, with cylinders of 13 inches diameter, and 18 inches length of stroke. The steam, which varies from 56 lbs. to 60 lbs. pressure in the boiler, is admitted to the piston for one-fourth the length of the stroke, the remainder working by expansion. The nominal power was 20 horses, but the effective power rarely exceeded 18½ horses. The cylinders are placed diagonally, at right angles to each other, and work to one crank upon the main driving shaft, which runs direct to the propeller without gearing or bands.

The propeller, which makes 95 revolutions per minute, is on Woodcroft's plan, with a pitch expanding from 10 to 11 feet: after being enlarged at three several times, from 3 feet 10 inches diameter, it is now 5 feet 4 inches diameter by 20 inches long; it is of wrought iron, and consists of four short arms, whose united area is equal to 16 square feet; of this, only about 13 feet are immersed, a portion of the upper side being constantly above the water: the angle of the centre of the floats is 45°, and about 40° at the periphery.

The author then gives the details of a number of experiments, and he states that, although the proportions of the vessel were not favourable for speed, her length being only five times the beam, and the sectional displacement 28 feet, the speed was greater than that of all the steamers on the Mersey, except the large sea-going steam vessels.

That the 'slip' of the propeller, when tried by Massey's log, was less than five per cent.

That the action of the screw across the way of the vessel, did not appear to affect the steering, or have the slightest tendency to turn the head of the vessel.

The author is of opinion, that engineers in general, fearing a loss might take place from lateral action, with a long pitch, and that the steering would be affected if the propeller were not immersed, have made the propellers too small, and that the short pitch, which had rendered a high velocity necessary, was detrimental.

Several satisfactory experiments, in towing vessels, are also mentioned, and it is stated that, in a heavy sea, the superiority of the screw propeller was very visible.

The dimensions are then given for vessels of war and of commerce, working with screw-propellers, driven direct by the oscillating engines, which the author anticipates would prove much more serviceable and seaworthy than any of the paddle-wheel steamers now in use.

The paper is illustrated by a diagram of the propeller of the 'Liverpool Screw,' and by plans of the machinery and general arrangements of the proposed frigate and large steamers.

Mr. Rennie observed, that the Institution was much indebted to Mr. Grantham, for bringing forward the subject of screw-propellers; the more particularly as it had now become of national importance, and that every attempt at perfecting the sub-marine propeller merited encouragement.

It was difficult correctly to assign the merit of the first invention of this species of propeller, as it had been tried at various periods, and with as varied results, on the continent, in the United States of America, and in this country;[*] but it appeared

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[*] The dates of the experiments on screw propellers are nearly in the following order:—

Baron Seguier	1792
Fulton	1796[†]
Shorter	1802
Trevithick	1815
Millington	1816
Lowe	1817
Whytock	1819
Perkins	1824
Brown	1825
Woodcroft	1826
Cummerow	1828
Sauvage	1832
Woodcroft	1832
Ericson	1836
Smith	1836
Lowe	1838
Hunt	1839
Rennie	1839
Blaxland	1840
Carpenter	1841

[†] In a letter to Dr. Cartwright, dated Paris, February 16, 1798, Fulton says, "I have just proved an experiment on moving boats, with a fly of four parts, similar to that of a smoke-jack, and I find this apply the power to great advantage, and it is extremely simple."

certain that Mr. Samuel Brown, the inventor of the gas vacuum engine, was among the first who applied the sub-marine propeller with any practical effect. The propeller used by him was on the principle of a regular screw, and consisted of two blades, which were affixed at an angle of 45° to a horizontal shaft, which was placed in the bow of the vessel, and he believed that it had also been used in the stern. This propeller was driven by a gas vacuum engine, of the nominal power of 12 horses, and actually caused a vessel of 60 feet in length, to move at the rate of 6 or 7 miles per hour.

M. Sauvage, of Boulogne-sur-Mer, had also made several attempts at propelling vessels by the same means, and it was very gratifying to find that his services had recently been acknowledged and rewarded by the King of the French.

It was, however, Mr. F. P. Smith who first rendered the screw-propeller practically useful; for his perseverance, being aided by spirited capitalists, induced the building of the 'Archimedes' steamer, the machinerv of which was constructed by Messrs. G. and J. Rennie, in the year 1839. The results obtained from that vessel were well known, and caused the subsequent construction of the 'Princess Royal,' the 'Great Northern,' H. M. S. V. the 'Bee,' the 'Rattler,' and the 'Dwarf,' formerly the 'Mermaid,' a model of which was exhibited with the various forms of screws used in the different experiments. The 'Great Britain' not having having yet been to sea, could only be mentioned as a projected experiment.

The 'Dwarf' was 130 feet in length, 16 feet 6 inches in breadth, 9 feet deep, and was 164 tons burthen. The power of the engines was 90 horses, making from 30 to 32 strokes per minute. Friction wheels without teeth were first tried for giving motion to the propeller; but on account of their slipping and being very noisy, they were abandoned, and two spur mortice-wheels with wooden teeth, working into iron pinions, were substituted; the speed thus attained was from 150 to 160 revolutions per minute. The propeller was of cast-iron, and was moulded in loam without a model, by means of iron templates cut to the required curve, which was formed from a solid cone revolving on its axis, during the perpendicular descent of a tracer. The advantage of this form over the cylindrical screw, was an increasing pitch, so formed, that while the propeller was rotating on its axis, the vessel was advancing, and thus producing the least possible amount of 'slip.' This was exemplified by the form of the various models on the table.

The principal point to be obtained in a screw propeller, was a form which should offer but little obstruction to the water, and yet act upon it so as to exert full power in propulsion; a large portion of a complete screw having no useful effect, had induced the introduction of propellers with several blades; thus doing away with the useless part of the surface. A great portion of the centre part of the screw of the 'Archimedes' had been cut away, but the effect had not been so good, on account of the arms of the screw obstructing the free passage of the water; the propellers with three arms were, he believed, preferred to those with a larger number.

The 'Dwarf's' propeller consisted of three curved blade. formed on the conoidal principle, by variable curves approxi mating to angles of from 27° to 30°, and advancing at the rat of 7 feet 6 inches per revolution. It was 5 feet 10 inches in diameter, by 2 feet deep in the direction of its axis, and the area was about 15 square feet, which was nearly one-fourth of the area of the midship section of the vessel at light draught; but since the 'Dwarf' had been transferred to H. M. Service, the mean draught had been increased 1 foot, and the area of the midship section in proportion; her speed had in consequence been reduced from 12 to 11 statute miles per hour.

The following were the results of the trials made by Captain Sir Edward Parry, Mr. Lloyd, and Mr. Murray, at the measured mile in Long Reach on the 15th May, 1843:—

			Stat. Miles.	Mean.	
1st	Experiment	against tide .	9·890	12·145	
2nd	ditto	with tide . .	14·400		
3rd	ditto	against tide .	9·756	12·078	
4th	ditto	with tide .	14·400		
5th	ditto	against tide .	9·890	12·203	
6th	ditto	with tide . .	14·516		
		General Average . . .		12·142	Stat. Miles per hour.

The draught of water was 5 feet 8 inches.

The 'Dwarf,' under the command of Lieutenant Nicholls, left Greenhithe in company with the 'Hecate,' Captain Bower, on the 14th January, 1844, and reached Portsmouth on the following day; on the 20th she left Portsmouth accompanied by the 'Hecate,' and although it was necessary to reduce the speed of the engines to 26 revolutions, in order to keep with her consort during the night, they reached Falmouth on the 21st, after an additional run towards the Scilly Islands, making a distance of 200 miles in 23 hours, having burned 10 tons of coals in 27 hours, from the time of getting the steam up. The two steamers left Falmouth on the 23rd, and reached Bear Haven on the following day, having run 135½ knots, or 156 miles by the log, in rough weather in 12 hours, and with bad coal; the engines making from 28 to 29½ revolutions per minute. She anchored during the night at Bear Haven, and on the following day, (the 26th,) reached Tarbert, the total distance from Falmouth being upwards of 400 miles.

Mr. Galloway said, that it was extremely difficult, if not impracticable, to arrive at the true amount of the 'slip' of the propeller, because from its position abaft, or what is termed the deadwood of the vessel, it acted in a current which was continually flowing to fill up the cavity, which would otherwise be formed by her progress through the water. The relative motion of a stream through the arches of a bridge, and in the wake of its piers, was an apt illustration of what unquestionably took place, (and from the same law,) in the case of a moving vessel. The screw, therefore, when acting in this current, might be compared to what would occur, if a paddle-wheel steamer was supposed to be moving in still water, while the floats acted in side canals, which flowed in the same direction as the vessel. Whether the benefits derived from this following current giving resistance to the screw, were not counteracted by the deduction of so much of what is termed minus pressure from the ship itself, was not at present under consideration. His object was to show, that an accurate estimate of the amount of 'slip' of a screw, could not be arrived at, until the rate of the following current was first ascertained.

That the 'slip' must be much greater than Mr. Grantham assumed, would, he thought, be admitted, both from the circumstance he had stated, and from the fact that screw propellers, when worked with the vessels at their moorings, invariably moved at a ratio at least equal to one-half the speed obtained when running. It was clear, therefore, that the 'slip' which was dependent on the proportion of the resistance of the screw, compared to that of the vessel, must always exist in a degree; but that, it might in the screw, be reduced below that of the paddle-wheel, was evident, because in the best modifications of wheels, or where the immersed segment was small, the paddle must turn in the water, in effecting a change of position from its angle of entrance to that of its emersion, and this unavoidable angular action, even when the upper edge of the float coincided with the rolling circle, was still so much 'slip' inevitably encountered; this 'slip' too became very considerable when the vessel was in a seaway; but the 'slip' of the screw decreased with its magnitude, and in the like proportion, its action approached that of a screw moving in a solid. It appeared, therefore, to him, that if the 'slip' was small, the spiral or increasing pitch, would be a disadvantage, because a true screw would, under those circumstances, create little or no disturbance; while the spiral in that case, would have the contrary effect, for the same reason that a helix would pass with facility through a solid, in which a spiral or untrue thread would become fixed, or move with difficulty. In the absence of all 'slip,' or in so small a slip as Mr. Grantham assumed to have taken place in his experiments, the effect of a propeller with an expanding pitch, would be like that of a curved plate, moving through the water in a right line; while the true helix would have acted like a flat plate moving in the direction of its own plane; that is to say, the opposing forces would merely consist of edge resistance and surface friction, which were common to every kind of propeller.

The advantage too, which was assumed to arise from this spiral propeller, merely affected the question of magnitude, for it was clear that, whether the screw acted upon a large body of water at once, or gave a second impulse to a lesser quantity, the result would be similar, as to the sum of the effect upon the vessel. It was true that in certain kinds of fish (he would instance the electrical eel), the impulse produced by the ventral fin, was by an increasing spiral, the length of the curves becoming greater towards the tail; yet it appeared probable, as we could only see this eel in confinement, that the peculiarity he alluded to, was only developed in producing a change from rest to motion, for which it was well adapted, (because the 'slip' was great and the progress small,) and that when in rapid motion, it was probable, that the fin acted in a true spiral.

Mr. Rennie stated that the 'slip' of the screw of the 'Dwarf' was from 1-8th to 1-9th. That with respect to the general question of the 'slip,' he conceived that it depended upon the comparative resistance between the vessel and the propeller. The case was similar to the immersed plane surfaces of the paddle-wheels of a steamer and of the vessel itself; the resistance of the midship section was reduced by the forms given to the fore and after bodies, which gave the vessel what might be termed more 'mobility.'

According to the experiments of Mr. Peter W. Barlow, read before the Royal Society, May 29th, 1834,* the 'mobility' of several of Her Majesty's steamers was found to vary from 1-15th to 1-24th of a plain surface, equivalent to the area of their midship sections; or in other words, a plane float of 1 foot square, was equivalent to the midship section of the vessel, of which the mobilities were from 1-15th to 1-24th. There could be no doubt, that the improvements in the forms of the modern vessels, would have produced even less resistance, and he believed that it might now be taken at from 1-30th to 1-40th, so that consequently a less area of float or propeller, would suffice to overcome the equilibrium and produce less 'slip.'

Mr. Smith observed, that the screw with three blades, which had been used in the 'Dwarf,' seemed calculated to produce the best effect. The opening towards the centre of motion, by reducing the arms of the screw blades, as far as the requisite strength would allow, was judicious, as, from the comparative slowness of the rotative motion towards the centre, little propulsive effect was produced; whereas the resistance to onward motion by the arms, if they had not been reduced, might have been considerable; besides, if the arms were in that part broad, there would have been greater tendency to produce centrifugal action on the water. The gradual alteration of the angle of the blade, to the axis of the screw or onward path of the vessel, was also judicious, as it afforded a greater onward action of the blade at the entrance, whilst it gradually curved round to nearly a right angle with the path, so as to leave the water without causing any revulsion; it had thus an action in some respects similar to that of the tail of a fish. The salmon, when it 'made a run,' put down all its side fins, and, solely by the oblique action of the tail, was propelled forward with great force and speed, to which the flexibility and form of the tail, and more especially its curving form, to accommodate its leaving the water without causing revulsion, principally contributed.

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* "An Investigation of the Laws which govern the motion of Steam Vessels, deduced from Experiments, by Peter W. Barlow, C. E." Phil. Trans., 1834, p. 309.

Some years ago, Mr. Smith had made experiments with fans for blowing air, and, so far as he could recollect, the form of greatest effect much resembled in principle that of the propeller under consideration.

Mr. Farey said, that in order to continue the series, given by Mr. Rennie, of steam vessels which had been recently constructed with screw (or rather oblique-acting) propellers revolving under water, it would be desirable that the meeting should have the particulars of a vessel called the 'Napoléon,' which had been built at Havre by M. Norman, and fitted with engines and machinery constructed in this country by Mr. Barnes.

Whilst at Havre last summer, Mr. Farey had very minutely examined that vessel, and he considered it equal to anything that had yet been executed of the kind, and a fair specimen of the perfection to which that mode of propelling had, up to the present time, been brought for sea-going vessels. Mr. Barnes and M. Norman were well known in their respective departments, and they had been accustomed to co-operate during some years past. The engines which had been made and sent by Mr. Barnes to France, and fitted in vessels constructed by M. Norman, had in most cases, paddle-wheels with moveable or mechanical paddles, on the plan introduced by M. Cavé, which possessed a decided advantage over ordinary paddle-wheels; the loss of power occasioned by the paddles entering and leaving the water too obliquely, being much diminished. In comparing the performance of the 'Napoléon' with vessels fitted with those mechanical paddles, there was less effect produced by the oblique-acting submersed propeller, when considered merely as a mode of employing a given amount of power, to propel a given vessel through the water in a calm; but if the same power, as the engines of the 'Napoléon,' had been applied with mechanical paddle-wheels at the sides of the vessel, (such as Mr. Barnes had been accustomed to construct,) the vessel would have had more speed in calm weather and smooth water, than had been attained by one revolving propeller, with oblique-acting blades, applied under water at the stern; and it was possible that a greater amount of speed might have been attained, even with well-proportioned common paddle-wheels.

Nevertheless, the submersed propeller at the stern admitted of the use of sails, in concert with steam power, or in lieu of it, (when the wind was strong, and in a tolerably favourable direction,) with much greater advantage than could be done in steam vessels, with the ordinary or even mechanical paddle-wheels, although the latter were well adapted for acting in concert with sails, because they would perform well, when the paddles were either deeply, or slightly immersed. The proper and most advantageous action of ordinary paddle-wheels was very greatly impaired by variations of immersion: the mechanical paddles (when properly proportioned) were less influenced, and the submersed propeller still less; in fact, being wholly under water at all times, its action did not appear to be sensibly affected by any such alterations of the depth of its immersion as were likely to take place in the roughest waves, or the greatest variations of draught.

When all circumstances were considered, it might be safely concluded, that vessels fitted with revolving submersed propellers, would answer well for making regular sea voyages, either in winter or summer; and on an average, he thought, that their passage would be performed at least as well (if not better) than those of any steam vessels now in use, and with an economy of fuel, arising from such vessels making a more advantageous use of their sails, and less use of their engine power.

M. Norman, in reply to questions from Mr. Rennie, regretted that his slight knowledge of the English language not only precluded him from fully comprehending the narrative of the paper, and the statements of the several speakers, but also rendered it obligatory that he should communicate to the meeting in French, the few remarks which he could not withhold, after the pressing notice of the chairman.

Many experiments had been made in France with screw propellers, by numerous inventors, as far back as the latter part of the eighteenth century, and by M. Cavé and others at recent periods; but the most extensive experiment was that of the 'Napoléon,' for which Mr. Barnes had constructed the steam engines and machinery in England, and which, he might be allowed to say, had given complete satisfaction.

The 'Napoléon' was built at Havre, and launched at the latter end of 1842, for the service of the French Government Post-Office in the Mediterranean. The vessel was built of oak timber, copper-fastened and coppered. Its dimensions were as follows:—

	Metres.		English feet.	in.
Length of vessel from stem to stern....	47·5	=	155	8
Ditto at the surface of the water....	45·2	=	148	6
Extreme breadth	8·5	=	27	8
Ditto at the surface of the water	8·32	=	27	4
Draught of water when light loaded, abaft	3·6	=	11	10
Ditto ditto forward	2·26	=	7	5
	Sq. metr.		Sq. ft.	
Area of the midship section, at the above draught of water	13·4	=	144	
Ditto of the surface in contact with the water, occasioning friction..........	401	=	4320	

The revolving propeller was fixed in a space or opening abaft the usual stern-post (to which, in an ordinary vessel, the rudder would be hung), and withinside another stern-post, which was erected on a prolongation of the keel, farther aft, for sustaining the rudder, so as to leave a space between the two posts for the reception of the propeller. The centre of the propeller was (1·82 metre =) 6 feet beneath the surface of the water; its diameter was (2·28 metres =) 7 feet 6 inches, and the highest point of its periphery was 2 feet 3 inches below the water line, when the mean draught of water aft was about 11·82 feet.

Four propellers of the same diameter, but of different forms, were made, in cast iron, under the direction of Mr. Barnes, and were tried with various success during the past year. The propellers had been altered several times, and it was found that within certain limits, by cutting away the ends so as to shorten the length of the screw, (which had also the effect of diminishing the surfaces of the blades) the speed of the vessel was increased, and the vibration was reduced; a portion of this effect had however been attributed to using four arms. A propeller with three blades, occupying the whole of the circle, was first tried; others which presented less central surface answered better, and the best, which was still in use, had four blades, which occupied six-tenths of the area of the circle, when viewed in the direction of the axis, leaving four-tenths of that area vacant, for the free escape of the water between the blades, whose obliquity was such as to produce an advance of (3·12 metres =) 10 feet 3 inches in a revolution.

The steam engines were nominally of the power of 65 horses each, = 130 horses together; their cylinders were 45 inches in diameter, their pistons making usually from 27 to 28 double strokes of 3 feet 6 inches in length per minute. The motion was communicated to the propeller by a spur wheel of 126 teeth, working into a pinion of 29 teeth, which gave nearly $4\frac{1}{3}$ revolutions for each stroke of the engine, or about 120 revolutions of the propeller per minute. The ordinary speed of the vessel, without any sails being used, was 10 knots or 11½ statute miles per hour. She had three masts of considerable height, the rigging being that of brig forward, and that of a schooner at the main and mizen masts, with as great an extent of canvas as would be used in any sailing yacht. When the wind was favourable and the sails could be used, the speed increased to 11 or 12 knots per hour.

After a series of experimental voyages, the vessel had gone to her station in the Mediterranean, where she was now in contant service, and had gone through some rough weather with great success; her motion was described as being remarkably easy, she rolled very little, steered better than ordinary vessels, for the propeller appeared to give increased effect to the rudder, and the propeller had never been observed to show itself above the water even in the heaviest seas, when the pitching was at its maximum.

Mr. Galloway remarked, that the properties of a screw with an increasing pitch, had been slightly invested by Tredgold, in his work on the Steam Engine, so early as 1827. That author had briefly referred to the subject of screw propellers, and had given some logarithmic calculations of their properties, from which he drew the conclusion, that the true screw could not be carried beyond a single convolution, with any good effect; whereas by a progressive increase of the pitch, the propelling effort would be continued, until the spiral became expanded into a straight blade parallel to the axis. It was Mr. Galloway's opinion, that more was to be expected from ascertaining the best position for placing the screw, with reference to convenience and effect, than from any slight change in the form or the number of the blades of propellers.

Mr. Samuda said it appeared to him, that the action of the propeller tended to drive the water from it at a right angle with its surface, and as it formed a diagonal line with the keel of the vessel, some portion of the force was not efficiently used for propulsion; he conceived therefore that by a judicious arrangement of shrouding, round the extreme circumference of the propeller, the diagonal currents of the water might be diverted into a direction parallel with the way of the vessel, and thus cause the whole of the reaction to become available for propelling. Such an arrangement would enable propellers of a much coarser pitch to be employed, and their speed being reduced in proportion, they could be more readily driven directly by the engine, without the intervention of bands or gearing.

M. Norman said, that M. Cavé had tried a series of experiments on screws of various forms working in cylinders; and also, he believed, with shrouding on their extremities, and he understood that no advantage had been found to result from such modifications.

Mr. Cowper presented an instrument, which he had exhibited when the aerial machine was incidentally mentioned; it consisted of a fan composed of three or more blades, set at a regular curve of an axis. When this axis was placed vertically in a socket, and a rapid rotary action communicated to it, the fan rose in the air to the height of between 100 and 150 feet. On reversing this fan and using the same propelling force, it would not rise at all. This fact evidently showed that the action of the curved fan upon the air, or of the propeller upon the water, was like that of a screw in a solid, every part of the surface of the blade of a well-formed propeller producing its portion of effect.

Mr. Cooper directed attention to the contrary effect produced by two fans of similar areas, whose arms were, in the one case, mere planes set at an angle with the axis, and in the other, blades forming part of, and being placed at a given curve round the axis.

If it were supposed, that the surface of each blade was divided into a given number of equal parts, when the fan, of the former or angular shape, was set in motion, the first part, impinging on the air, communicated a movement to it, and the second and succeeding parts finding no resistance from the disturbed fluid, the body had no tendency to rise; but in the latter, or curved-shape, the second and succeeding parts tended to overtake and act upon an undisturbed fluid, and thus had a tendency to rise upon an irregular inclined plane, described by its gyration through the air.

By the law that the resistance increased as the square of the velocity, he conceived, that in adapting propellers to vessels, their dimensions should be proportioned, not only to the area of the midship section, but also to the speed of the engine. At the same time, the consideration of the form of the blades was very important. In experiments with the revolving fan instrument, he found, that although on all occasions the same rotative force was applied, a fan with three arms, whose united areas were 3·721 inches, when set at a given angle, did not rise freely; the same form and area, when set to a proper curve, rose to a very considerable height; but when a fan of twelve arms, formed from a circle or disc of 28·274 inches area, divided into twelve arms, was set in motion, it would not rise at all. With other fans, of intermediate forms, areas, and curves, various results were obtained, which were curious problems for engineers interested in the construction of propellers.

Mr. Grantham expressed his pleasure at finding his paper had so much excited the attention of the meeting, and he hoped it would be followed by communications from members who had devoted more time to the subject; for instance, the numerous experiments made by Mr. Brunel and Mr. Guppy, before deciding on the use of the screw-propeller for the 'Great Britain,' and those made in the presence of the Government engineers, Mr. Lloyd and Mr. Murray, on board the 'Bee,' the 'Rattler,' &c., would be very interesting.

Mr. Grantham exhibited a diagram of the propeller used on board the 'Liverpool Screw;' it was composed of four blades with broad shovel ends, fixed at a mean angle of 45°. This form, although very successful in this case, could not, he thought, be recommended for large diameters. The results of his observations induced him to think, that the blades of a propeller should not be more than 4 feet apart; he would, therefore, advise the adoption of Ericson's form and mode of construction, which he considered the best that had been hitherto introduced; the ring within the arms permitted any number of blades to be affixed, and a large area of acting surface, judiciously disposed, could thus be obtained. He objected to propellers with three arms, chiefly on account of the small amount of surface obtained.

As to the 'slip,' which Mr. Galloway had so ably commented upon, he was aware that it did exist in all cases, but he was of opinion that the amount was exaggerated; he had not only made accurate experiments with Massey's log, but being repeatedly in a small boat, which was towed close astern of the 'Liverpool Screw,' he found that there was very slight disturbance of the water, and that there was not any depression behind the blade of the propeller on entering the water; this could be easily observed, as a portion of the upper blade was always above the surface. It had been anticipated that this arrangement would, with so short a vessel as the 'Liverpool Screw,' have caused a constant tendency to bear over in one direction, but not the slightest disturbance of the steering was perceived, and the vessel's course seemed to be quite as straight as it would have been with paddle-wheels.

Mr. Grantham wished it to be understood, that his object in bringing forward the account of the 'Liverpool Screw,' was not so much to cite that vessel's powers, as to point out the feasibility of working propellers at a slower speed, and that condensing engines could be applied with advantage, avoiding the bands and gearing, which had hitherto been found so objectionable.

Mr. Braithwaite was of opinion, that where deep immersion was not practicable, two propellers would be preferable, in order to prevent any disturbance in the steering. Captain Ericson had adopted that plan in boats of light draught.

Mr. Braithwaite then presented a drawing of the midship section of the 'Princeton,' American frigate, showing the elevation of Ericson's engine on board. The vessel was 164 feet long, with a breadth of beam of 30 feet; the depth of the hold was 22 feet 6 inches, the draught of water 17 feet 6 inches, and the burthen about 700 tons; the propeller was 14 feet in diameter, with six blades, and made from 32 to 36 revolutions per minute, at which rate the vessel's speed was stated to be nearly 14 miles per hour. The engines were about 400 horses power; they were of peculiar construction, having two steam cylinders or chests, containing vibrating pistons or flaps, with cranks upon the ends of the suspending pivots; both these were coupled by connecting rods to a main crank on the driving shaft; the length of these cranks being so proportioned, that their alternate vibrations should give a rotary motion to the main crank, and thus act directly upon the propeller, without the intervention of bands or gearing.

This principle was tried successfully in the year 1839, by Ericson, on the Thames, in a tug-boat named the 'Robert Stockton,' after the projector, who had succeeded in introducing the system to the American Navy, and now commanded the 'Princeton.'

The boilers of the 'Princeton' were constructed for burning anthracite; the whole of the machinery was so placed as to be out of the reach of shot, and the vessel was ship-rigged, so that by unshipping the screw, she could be rendered as effective as any sailing vessel, with a fair wind, or in case of accident to her machinery. Mr. Braithwaite hoped in a short time to bring before the Institution, an account from Captain Ericson, not only of the 'Princeton,' but of several of the other vessels he had fitted with his engines and propellers, since his residence in the United States.

Mr. Galloway said that during the experiments with the 'Archimedes,' a proof had been elicited that the 'following current' had a very considerable effect on the action of the propeller. During one of the trials the vessel was backed astern, when it was found, that the speed of the engine increased three or four revolutions per minute, while the speed of the vessel appeared to have diminished. This experiment was, he contended, conclusive as to the fact that the 'slip' was greater than would appear by looking merely at the rate of the vessel compared to that of the screw. He did not, however, think that the 'slip' ought to be considerable, with a well-constructed propeller. Increased magnitude in a screw, would have the same effect in creating resistance, as increased magnitude in any other submerged body. The utility of the increasing pitch, however, was involved in, and solely dependent on, the amount of 'slip' which would be found to be attended with the least disadvantageous results in other respects; and here Mr. Galloway would observe, that Mr. Cowper's experiments with the revolving fan instrument confirmed his view; for it must be recollected, that there the 'slip' was much greater than the rate of ascent; the only condition being thus developed in which the utility of an increasing pitch could be contended for.

The advantage of turning the propeller by the direct action of the engines, was generally acknowledged. The method of driving it was nearly the only problem remaining for solution, and that difficulty being once overcome, screw-propellers must necessarily, from their vast advantage over paddle-wheels, in every respect but that, be universally adopted.

Mr. Hawkins said, that about the year 1825 Mr. Jacob Perkins adapted to the stern of a canal boat, a propeller of about 25 feet in circumference, which might be described as resembling two sets of wind-mill vanes, the solid axle of one set revolving within the hollow axle of the other, the two axles being turned in contrary directions, and the dip of the blades being about half their radius. The propulsive force was stated to have been very effective; the experiments, which were put an end to by the breaking of part of the engine, were never renewed, in consequence of disputes among the patentees; but he considered that propeller as the best that had hitherto come under his notice, and he had endeavoured to draw attention to it by reading an account of it, at the meeting of the British Association at Cork, in 1843.

Mr. Grantham stated, that in order to test the comparative effect of the expanding pitch, Mr. Woodcroft had adapted to the stern of a vessel, two screws of equal area, one being of a regular, and the other of an expanding pitch; they were connected by a cross shaft, and were worked by manual power, and it was found that the vessel always yielded to the impulse of the expanding pitch propeller, and was turned by it from the direct course. With respect to the advantage of a large amount of surface, he had found that the action of the propeller of the 'Liverpool Screw,' which had been enlarged three times, was decidedly improved by the alterations; the speed of the engines always remaining the same.

[*To be continued.*]

CHEMISTRY SIMPLIFIED;

Being a Lecture delivered by Andrew Ure, M.D., F.R.S., &c. to the Pharmaceutical Society.

(Continued from page 291, Vol. XXIV.)

II. ACIDIMETRY.

I HAVE already stated, that water of ammonia of standard strength, faintly tinted with litmus, affords a most exact and convenient acidimeter, when poured or let fall from a graduated dropping-tube. Bicarbonate of potash also, when dissolved in water, so that 1000 grain-measures contain one atom of the salt counted in grains, is a good test-liquor for the same purpose; for if the centigrade-measures expended in effecting neutralization, are multiplied by the atomic weight of the given acid, the product is the quantity in grains of acid present.

Acidimetry may be likewise exactly performed by measuring in the cylindric gas-meter (fig. 1), the volumes of carbonic acid gas disengaged from pure bicarbonate of potash or soda, by a given weight of any acid, taking care to use a small excess of the salt. Thus, for example, 16·8 grains of dry and 20⅔ of hydrated sulphuric acid disengage 10,000 water grain measures of gas from bicarbonate of potash. Therefore, if 20⅔ grains of a given sulphuric acid be poured into the flask of fig. 1, upon about 50 grains of the bicarbonate, powdered and covered with a little water, it will cause the evolution of a volume of gas proportioned to its strength. If the acid be pure oil of vitriol, that weight of it will disengage 10,000 grain measures of gas; but if it be weaker, so much less gas—the centigrade-measures of which will denote the per centage value of the acid. If the question be put, how much dry acid is present per cent. in a given sulphuric acid, then 16·8 grains of the acid under trial must be used; and the resulting volume of carbonic acid gas read on the scale will denote the per centage of dry acid.*

For nitric acid, we should take 22·6 grains; for hydrochloric or muriatic acid, 15.34; for acetic acid, 21·6; for citric acid, 24·6; for tartaric acid, 28 grains: then in each case we shall obtain a volume of carbonic acid gas proportioned to the strength and purity of these acids respectively. The nitric, hydrochloric, and acetic acids, are referred to in their anhydrous state; the tartaric and citric in their crystalline. If the latter two acids be pure, a solution of 24·6 grains of the first and of 28 of the last, will disengage from 50 grains of bicarbonate of potash, 10,000 grain measures of carbonic acid gas.†

Acidimetrical operations may likewise be performed by determining the *weight* of carbonic acid gas expelled from the bicarbonate of potash, or soda, by a given quantity of any acid, in the apparatus either fig. 2 or fig. 3. Here the weights to be taken are as follows: in reference to

	Grains.
Dry Sulphuric acid	9·127
„ Nitric	12·33
„ Hydrochloric	8·29
„ Acetic	11·67
Crystallized Tartaric	13·31
„ Citric	15·13

Each of these quantities of real acid, with 25 or 26 grains of bicarbonate of potash, will give off 10 grains of carbonic acid gas; and hence, whatever weight the apparatus loses, being reckoned in grains and tenths of a grain, denotes the per centage of acid in the sample under trial, without the necessity of any arithmetical reduction. Persons accustomed to the French metrical system, may use deci-grammes instead of grains, and they will arrive at the same per centage results.

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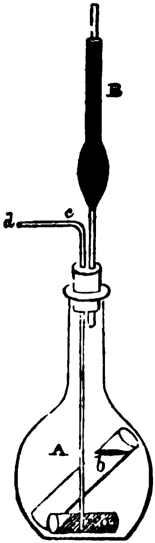
* The bicarbonate must be free from carbonate, a point easily secured by washing its powder with cold water, and drying it in the air,

† The expulsion of the gas may be completed by surrounding the flask with a towel dipped in hot water.

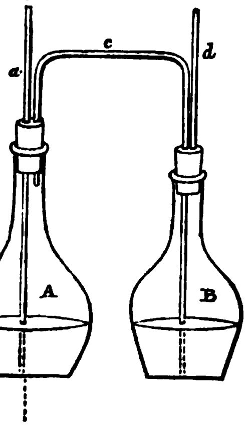
Fig. 4.



The preceding experiments, in reference to the weight of carbonic acid gas expelled for the purpose of either alkalimetry or acidimetry, may also be made by means of the ordinary apparatus represented in fig. 4. *A* is a small matrass which contains the acid or carbonated alkali at its bottom; and conversely the alkali or acid, for their mutual decomposition in the small test-tube, shown first at *b*, nearly upright and filled, but afterwards at *a*, horizontal and emptied. *B* is a bulbous tube filled with fragments of chlorcalcium for absorbing the aqueous vapour that rises with the carbonic acid gas, and *d, c*, is a small bent tube which dips into the liquid in the matrass. The weighings, &c. may be conducted as already detailed; and when the effervescence is completed, the residuary gas is sucked up through *B*, while the atmospheric air enters to replace it at the orifice *d*, of the bent tube.

The NEW methods which pervade the whole treatise of Drs. Fresenius and Will, are all based on the principle of estimating alkalinity, acidity, and the oxygen in manganese (or chlorometry) by the weight of carbonic acid gas evolved. As in taking these measures the gas must be discharged without carrying water off with it, an elegant and ingenious little piece of apparatus has been invented by the authors for effecting that purpose, and it will do it well. *A*, and *B*, (fig. 5) are two flasks (wide-mouthed medicine bottles may be employed). *A*, must have a capacity of from two ounces to two ounces and a half of water; it is advisable that *B*, should be somewhat smaller, say of a capacity of about one to one and a half ounces. Both flasks are closed by means of doubly perforated corks. These perforations serve for the reception of the tubes *a, c*, and *d*. *c*, is a tube bent twice at right angles, which enters at its one end just into the flask *A*, but descends at its other end, near to the bottom

Fig. 5.



of *B*. These tubes are open at both ends when operating; except the top end *b*, of the tube *a*, which is closed by means of a pellet of wax. The substance to be examined is weighed and put into the flask *A*, into which water is then poured to the extent of one-third of its capacity. *B*, is filled with common English sulphuric acid to about half its capacity. Both flasks are then corked (by which they become united by the rectangular tube), and the apparatus is weighed.

The air of the whole apparatus is next rarified by applying suction to the tube *d:* the consequence is, that the sulphuric acid contained in *B*, ascends into the tube *c*, and thus a portion of it flows over into *B*. Immediately upon its coming into contact with the carbonate contained in *A*, carbonic acid gas is disengaged, and in its escape must necessarily traverse the oil of vitriol in *B*, and therein deposit all its aqueous vapour before issuing from *d*. The sulphuric acid in passing over into *A*, heats the mixture at the same time, and thus promotes the expulsion of the gas. Whenever this ceases to flow, a little more sulphuric acid must be sent over into *A*, by suction from *d*, (or rather from a recurved tube attached, *pro tempore*, to it); an artifice which may be repeated till no more gas can be expelled, even when the contents of *A*, are heated, as they must be at the end by the excess of oil of vitriol.

From the aperture *b*, of the tube *a*, which has been all the time closed, the bit of wax is now to be removed, and to the tube connected with *d*, suction is to be applied, till all the carbonic acid lodged in the apparatus be replaced by atmospheric air. The whole is to be then cooled, wiped, and weighed; the loss of weight indicates exactly the quantity of carbonic acid which existed in the carbonate submitted to experiment. The process is no less neat than it is simple, and does honour to the ingenuity of its inventors. Their mode of deducing the per centage of alkali from the quantity of carbonic acid discharged in the operation is also quite exact, and suitable for continental chemists familiar with gramme weights and calculations, but certainly not for persons conversant only with ounces, drachms, and scruples, or even with grain subdivisions. The whole book, however excellent, needs for the British public transposition, before it can serve in this country the purpose intended by its scientific authors. Thus, in section 4, where several results of their analyses are given, the statements have a somewhat mysterious aspect. Should any one ask why the oracular number of 4·83 grammes of carbonate of soda is used as their standard weight for analysis, he can obtain no response in the book, either in a note or any where else. A German or French student, familiar with chemical computation, will probably be able to discover that 4·83 grammes of pure carbonate of soda contain, by Berzelius's tables of atomic weights, two grammes of carbonic acid; for 53·47 (one atom of carbonate) : 22·15 (one of carbonic acid) : : 4·83 : 2·00. Such is the simple solution of this apparent enigma, and of some other similar puzzles in the book. Indeed, unless the reader is aware of that proportion, he cannot see the grounds of the accordance in the results between experiment and theory, or why the numbers 2·010, 1·993, and 2·020 are presented as specimens of great precision. This accordance gives satisfaction when it is known that these numbers, in experiments 1, 2, and 3, oscillate on one side or other so near to the theoretical number 2·00. But four grammes and eighty-three centi-grammes, as also one gramme and 995 milli-grammes, are awkward weights for an ordinary English chemist or apothecary, which would require a month or two's residence in the laboratories of Giessen and Paris to manipulate with readiness.

Again, in testing carbonate of potash, our authors take 6·29 grammes as their unity of weight, undoubtedly, because, if pure, it should discharge by saturation with the sulphuric acid, two grammes of carbonic acid. Here, however, they have not stuck so rigidly as the school of Giessen usually does to Berzelius's atomic numbers; for his atom of carbonate of potash is 69·42; whence, 22·15 : 69·42 : : 2·00 : 6·68, hydrogen = 1·00; or 276·44 : 866·33 : : 2·00 : 6·268 oxygen = 100.

Admitting the value of the new method in testing neutral carbonates, it cannot be directly applied to the mixed carbonate and bicarbonate of soda, so commonly sold in this country for bicarbonate; nor is it applicable to the case of a mixture of caustic and carbonated alkali, without the tedious process of previous treatment with carbonate of ammonia and heat.

The new German method of *acidimetry* consists in determining how much carbonic acid gas is disengaged from a standard bicarbonate of soda, by a given weight of any acid. The twin-flask apparatus (fig. 5) is used. The weighed portion of acid is put into *A*, and a sufficient quantity of the soda into a test-tube, which is suspended upright with a silk thread fastened by the pressure of the cork to the mouth of the flask. On letting the thread loose, the test-tube falls, and the cork being instantly replaced, the whole gas evolved is forced to pass through the sulphuric acid in *B*, and there to deposit its moisture. The experiment is conducted in other respects as already described for alkalimetry.

The following extract from Drs. Fresenius and Will's *New Methods of Alkalimetry*, &c. will show the Giessen plan of calculating results:

"The amount of anhydrous acid contained in the hydrated acid under examination is determined from the amount of carbonic acid escaped, as follows:

"Two measures of carbonic acid bear the same proportion to one measure of the anhydrous acid in question, as the amount of carbonic acid expelled does to the amount sought of anhydrous acid. Thus, let us suppose, for instance, we had examined dilute sulphuric acid, and obtained 1·5 grammes of carbonic acid, the arrangement would be:

$$550\ (2 \times 275) : 501 = 1{\cdot}5 : x$$
$$x = 1{\cdot}36$$

The amount of sulphuric acid operated upon consequently would contain 1·36 grammes of anhydrous acid. Let us suppose the weight of this amount to have been 15 grammes, the sulphuric acid under examination would contain a per-centage amount of 9·06, for

$$15 : 1{\cdot}36 = 100 : x$$
$$x = 9{\cdot}06."^*$$

"SECTION XXIX. *Stating the Quantities of the various Acids to be used in their Examination.*—To enable our readers at once, without the trouble of calculation, to determine from the weight of carbonic acid expelled, the exact amount of anhydrous acid contained in those acids which are of most frequent occurrence, we have subjoined lists of certain quantities to be taken of each acid, for experiment, so that the number of centigrammes of carbonic acid expelled will directly indicate the per-centage amount of anhydrous acid in the acid under examination.

"Multiples of those weights may of course be substituted for the numbers given, according to the degree of dilution of the acid under examination. In such cases the number of centigrammes of the carbonic acid expelled must be divided by the same number which has served as the multiplier.

"These numbers are obtained by dividing the atomic weight of the acid by 550 (2 × 275, one eq. of carbon†), as follows:

"Two eq. of carbonic acid, corresponding to one eq. of the acid to be examined, how much should be taken of the latter to expel 1·00 grammes of carbonic acid?

"The arrangement for sulphuric acid, for instance, is as follows:

$$550 : 501 = 1{\cdot}00 : x$$
$$x = 0{\cdot}91 \text{ (or, more correctly, } 0{\cdot}911\text{).}$$

"When examining acids, it is most advisable to use that multiple of the unity (according to the degree of concentration) which will expel from one to two grammes of carbonic acid.

"I. SULPHURIC ACID.

"Unity 0·91 grammes (or, more correctly, 0·911 grammes.)

"Multiples:

$2 \times 0{\cdot}911 = 1{\cdot}822$ grammes
$3 \times 0{\cdot}911 = 2{\cdot}733$ „
$4 \times 0{\cdot}911 = 3{\cdot}644$ „
$5 \times 0{\cdot}911 = 4{\cdot}555$ „
$6 \times 0{\cdot}911 = 5{\cdot}466$ „
$7 \times 0{\cdot}911 = 6{\cdot}377$ „
$8 \times 0{\cdot}911 = 7{\cdot}288$ „
$9 \times 0{\cdot}911 = 8{\cdot}199$ „
$10 \times 0{\cdot}911 = 9{\cdot}110$ „
$15 \times 0{\cdot}911 = 13{\cdot}665$ „
$20 \times 0{\cdot}911 = 18{\cdot}220$ „
$30 \times 0{\cdot}911 = 27{\cdot}330$ „ &c.

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[*] *New Methods of Alkalimetry, &c.* pp. 93, 94.

[†] A typographical error in Mr. Bullock's edition; it should be *carbonic acid.*

"Thus, knowing that 0·91 of anhydrous sulphuric acid will expel 1·00 of carbonic acid, it will be easy to determine what multiple ought to be used, according to the degree of concentration of the acid to be examined."*

III. CHLOROMETRY,

AND THE TESTING OF BLACK OXIDE OF MANGANESE FOR ITS AVAILABLE OXYGEN.

THE value of manganese may be estimated very exactly by measuring the quantity of chlorine which a given weight of it produces with hydrochloric acid; the chlorine being at the same time estimated by the quantity of solution of green sulphate of iron which it will peroxidize. A process of this kind was long ago practised with chloride of lime (bleaching powder or liquor) by Dr. Dalton; and it has been since improved by Mr. Walter Crum. As the conversion of two atoms of green sulphate of iron into red sulphate requires only one atom of oxygen, this change may be effected by the reaction of one atom of chlorine in liberating one atom of oxygen, while this appropriates one of hydrogen from the hydrochloric acid.

The weight of 2 atoms of green sulphate of iron is 278 = (139 × 2), consisting of 2 atoms of protoxide = 72; + 2 of sulphuric acid = 80; + 14 of water = 126; in all = 278; and this weight is equivalent to 36 of chlorine, to 8 of oxygen, and to 44 of peroxide of manganese.† Therefore, if we take a solution of copperas, containing 278 grains in 1000 water-grain measures, that volume of liquid will represent, by the conversion of its protoxide into peroxide, exactly one atom, either of peroxide of manganese = 44 grains, or 1 atom of chlorine = 36. Hence the following plan of research:

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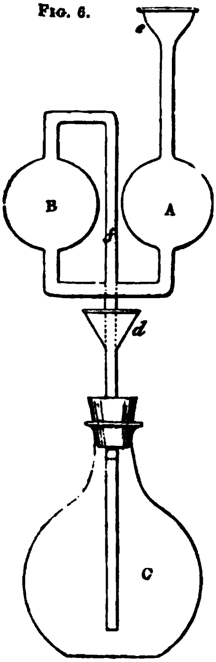
* *New Methods of Alkalimetry, &c.* pp. 103—105.

† Berzelius, in the 4th edition of his *Lehrbuch*, rates the atom of the green sulphate of iron (ferrous sulphate) at 129·43, hydrogen = 1, and considers it, after Mitscherlich, to contain only 6 atoms of water. I have ascertained, by the most careful experiments, that it contains 7 atoms of water; and that 139 grains of it, or 138·44 (Berzelius) are equivalent to 1 atom of chlorbarium, and to very nearly 40 grains of peroxide of iron.

This remarkable error has probably arisen from an attempt to measure the proportion of water in the salt from its loss of weight by desiccation. But I have found it impossible by this means to expel more than 6 atoms of water without causing partial decomposition of the salt by disengagement of sulphuric acid. The copperas so dried acquires such an affinity for water, that it absorbs fully one-tenth of its weight of moisture from the atmosphere in the course of an hour.

FIG. 6.



Into the flask or phial *C*, of my chlorometric apparatus (fig. 6), put 100 grains of the manganese to be tested, and into the globes *A*, *B*, pour out of an alkalimetrical tube charged with 1000 grain measures of the above *equivalent* copperas solution, from 200 to 500 grain measures, according to the supposed quality of the manganese; then introduce through the funnel *d*, some hydrochloric acid of known specific gravity (suppose 1.1.), containing nearly 20 per cent. of chlorine, also from a charged alkalimetrical tube; and apply gentle heat to the bottom of the flask by placing it in a capsule of water standing over a spirit lamp. The chlorine evolved will rise up through the tube *f*, (which passes merely beyond the cork), and will enter into the solution in *B*, and *A*, converting it into red sulphate. Have ready some dry paper imbued with solution of red ferrocyanide of potassium (red prussiate of iron.) Dip a slip of whalebone into the liquor in the globe *A*, through the funnel *e*, (represented in the figure rather too high above the globe), and touch the paper with its point. As long as it forms a blue spot, some of the iron still exists as black oxide, and the process is to be urged by the addition of a little more hydrochloric acid to the manganese, as long as chlorine gas continues to be disengaged, and while it maintains the level of the liquor in *A*, above that in *B*. Whenever the liquor by the reaction of the chlorine ceases to stain the test-paper blue, more of the solution from the graduated tube must be added till it begins to do so. By the cautious administration of the hydrochloric acid on the one hand, and of the copperas liquor on the other, the term of saturation will be arrived at in a few minutes. The manganese has then produced all the chlorine which it can yield. The number of water-grain measures of the liquor, or degree of its alkalimeter scale, being multiplied by forty-four, will give a product denoting the per-centage of pure manganese present in the sample; or being multiplied by thirty-six, a product which will denote the quantity of chlorine by weight which 100 grains of it can serve to generate.

Since one atom of pure manganese (44 grains) in producing 36 grains of chlorine, consumes two atoms = 74 grains of hydrochloric acid, the quantity of this acid expended from its graduated tube, beyond the due proportion of chlorine obtained, will shew how much of the acid is unprofitably consumed by foreign substances in the manganese. In fact, every grain of chlorine should, with pyrosulite, be generated by an expenditure of little more than 2 grains of real muriatic acid, or 10 grains weight of the dilute acid = about 9 grain measures of the graduated tube. Liquid hydrochloric acid, of spec. grav. 1·093, contains in 1000 grain measures exactly 200 grains of real acid. Hence 100 grains of pure pyrosulite should produce about 82 grains of chlorine, and consume about 169 of real muriatic acid = 845 grain measures of liquid acid, spec. grav. 1·093. Instead of taking 100 grains of manganese as the testing dose, 10 or 20 grains may be taken, according to the dimensions of the apparatus and the exactness of the operator.

"But if it be wished to obtain direct per-centages of *manganese* by the graduated tubes, without the trouble of reduction, then, for a dose of 10 grains, take a solution of fresh green copperas (free from adhering moisture), containing 632 grains in 10,000 grain measures. Proceed as above directed. If the manganese be a pure peroxide, 10 grains of it will generate as much chlorine as will peroxidize exactly 1000 grain measures, or 100 degrees by the test tube of the copperas solution. But if the manganese contain only 40 or 50 per cent. of peroxide, then 40 or 50 centigrade measures of the said solution will be equivalent to the chlorine evolved from it by the reaction of hydrochloric acid.

If the object is, on the other hand, to obtain direct indications as to *chlorine*, then a test-solution of copperas, containing 772 grains in 10,000 grain measures, will serve to shew, by the peroxidizement of each 10-grain measures, or of one degree of the centesimal scale of the test-tube, the reaction of one grain of chlorine available for bleaching, &c. in the chloride of lime or of soda, &c. The test-solutions of copperas should be kept in well-corked bottles, containing a little powdered sulphuret of iron at their bottom, which is to be shaken up occasionally, in order to preserve the iron in the state of protoxide.

The manganese should always be treated with dilute nitric acid before submitting it to the above-described ordeal; and if it exhibits effervescence, 100 grains of it should be digested with the acid for a sufficient time to dissolve out all the carbonates present; then thrown upon a filter, washed and dried before weighing it for the testing operation. The loss of weight thereby sustained denotes the per-centage of carbonates; and if calcareous, it will measure the waste of acid that would ensue from that source alone, in using that manganese for the production of chlorine.

That manganese is most chlorogenous which contains no carbonates, the least proportion of oxide of iron, and of sesquioxide of manganese.

The plan of testing manganese with oxalic and sulphuric acids was originally practised by M. Berthier and Dr. Thomson, but is lately modified by Drs. Fresenius and Will, who employ oxalate of potash, as likely to afford more exact results. They prescribe a multiple by 3 of 993 milligrammes = 2·979 grammes, as the quantity of manganese best adapted to experiment; but this quantity will not be found convenient by ordinary British operators.

I, therefore, take leave to prescribe the following proportions:—Into the vessel *A*, of my twin-globe apparatus (fig. 3) put 100 grains of the ground manganese under trial, along with 250 grains of oxalate of potash and a little water; poise the whole in the scale of a balance; then, by gentle inclination, cause a little of the strong sulphuric acid to pass from *B*, up into *A*. The oxygen thereby liberated from the manganese, reacting in its nascent state upon the oxalic acid, will convert it into carbonic acid gas; which, in passing through *B*, will deposit its moisture before escaping into the air. Whenever the extrication of gas ceases, after such a quantity of oil of vitriol has been introduced into the globe *A*, as both to complete the decomposition of the oxalic acid and to heat the mixture, withdraw the cork for a moment, to replace the carbonic acid with air; then cool, and weigh the apparatus. The loss of weight, in grains, will denote the per-centage value of the manganese; that is, the proportion per cent. of perfect peroxide in the sample. If the manganese be pure, no black powder should remain.

The preceding experiment is founded upon the following principle:—One atom of peroxide of manganese = 44, contains one atom of oxygen separable by sulphuric acid, and capable of converting one atom of oxalic acid into two atoms of carbonic acid, also = 44, which fly off; and cause therefore a loss of weight equal to that of the whole peroxide. To one atom of oxalic acid, which consists of three atoms of oxygen, and two of carbon —if one atom of oxygen be added, the sum is obviously four atoms of oxygen and two of carbon = 2 atoms of carbonic acid.

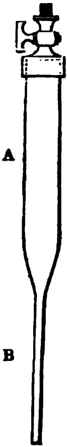
The apparatus (fig. 5) of Drs. Fresenius and Will, will answer perfectly well for making the same experiment, the manganese being put into *A*, with about two and a half times its weight of oxalate of potash, and the sulphuric acid being drawn over into the mixture by suction, as above described.

The economy of any sample of manganese, in reference to its consumption of acid in generating a given quantity of chlorine, may be ascertained also with the oxalic acid test. Forty-four grains of the pure peroxide, with ninety-three grains of neutral oxalate of potash, and ninety-eight of oil of vitriol, disengage forty-four grains of carbonic acid, and afford a complete neutral solution; because the one-half of the sulphuric acid = 49 grains, goes to form an atom of sulphate of manganese, and the other half to form an atom of sulphate of potash.

The deficiency in the weight of carbonic acid thrown off, will shew the deficiency of peroxide of manganese; the quantity of free sulphuric acid may be measured by a test-solution of bicarbonate of potash, and the quantity neutralized, compared to the carbonic gas produced, will shew, by the ratio of 98 to 44, the amount of acid unprofitably consumed.

APPENDIX.

Fig. 7.



In fig. 1, p. 287, the scale of the gas meter, *A*, should have been divided into 100 parts, instead of 10 parts containing only 6 subdivisions each. The tube *D*, may also be graduated, and may contain the due quantity of acid, for the purpose either of alkalimetry or acidimetry; and if the lower orifice be capillary, it will allow none of its contents to flow out, till the cork in the top orifice is loosened. To prevent the possibility of the loss of any gas, its lower end should be covered with liquid.

In fig. 2, p. 289, such a tube as *A*, *B*, see fig. 7, on margin, may be substituted with advantage for the funnel *B*, and as that tube, *A*, may be made of such dimensions as to contain enough of acid to supersaturate the bases of the carbonates in the phial *A*, there will be no necessity for a separate vessel to hold the decomposing acid. Thus the apparatus becomes very light, convenient, and may be placed in the small scale of a fine balance; whereas the twin matrasses of Drs. Fresenius and Will, fig. 5, p. 374, as furnished by Mr. Bullock, require a very large pan or scale to stand in. I flatter myself, that the instrument, fig. 2, so mounted, will be found an acceptable present to practical chemists, and that it will enable them readily to examine, not only carbonates, but also manganese and bleaching substances, with great precision, by the weight of carbonic acid disengaged, on the principles above explained.

Into the twin globe apparatus, fig. 3, p. 290, after the sulphuric acid is poured into *B*, a little water should be poured into *C*, before the carbonate is introduced into the latter. By this means the capillary throat of the tube under *A*, will not be apt to get choked with concrete salt.

The following quotations are from the work of Drs. Fresenius and Will, as edited by Mr. Bullock for the English reader. An accurate comparison may thus be made between the relative utility of their methods and mine to the practice of ordinary operators.

"Section XXXIV. *Examination of Manganese: having at the same time regard to the Amount of Acid required for its complete Decomposition.*—We have stated, at section 30, that it is not a matter of indifference with regard to the amount of acid employed in the production of chlorine from manganese, what are the minerals which this substance contains in admixture with the peroxide. The following modification of our method will give the most correct information on this point:

"Sulphuric acid of commerce is taken, and its amount of anhydrous acid determined, as directed at section 26, or by means of an accurate hydrometer.

Of this sulphuric acid as much is weighed into A, fig. 5 (sketch, page 374), as to give an amount of 5·47 grammes of anhydrous acid.

" The following table will show the amount which ought to be taken, according to the various degrees of concentration of the acid :

Specific weight found.	Per-centage amount of Anhydrous Acid found.	Amount to be used for the examination.	Specific weight found.	Per-centage amount of Anhydrous Acid found.	Amount to be used for the examination.
1.8485	81,54	6.708	1.8336	76.65	7.136
1.8480	81.13	6.742	1.8313	76.24	7.174
1.8475	80.72	6.776	1.8290	75.83	7.213
1.8467	80.31	6.811	1.8261	75.42	7.252
1.8460	79.90	6.846	1.8233	75.02	7.291
1.8449	79.49	6.881	1.8206	74.61	7.331
1.8439	79.09	6.916	1.8179	74.20	7.371
1.8424	78.68	6.951	1.8147	73.79	7.412
1.8410	78.28	6.987	1.8115	73.39	7.453
1.8393	77.84	7.027	1.8079	72.97	7.495
1.8376	77.40	7.067	1.8043	72.57	7.537
1.8356	77.02	7.101			

" As much water is then poured into A, as will fill the flask to about one-fourth ; and, lastly, from 6·5 to 7 grammes of neutral oxalate of potash, or from 5·5 to 6 grammes of neutral oxalate of soda, are added : 2.98 grammes of the (finely pounded) manganese to be examined, are then weighed—(the manganese must have been previously tested for carbonate alkaline earths : compare this section at the end)—into a small glass tube, such as used in acidimetry, and described in section 25. About the same quantity of pure pyrosulite*, in powder, is then put into another similar tube. The tube, with the manganese to be examined, is then suspended in A (fig. 5), as described at section 26, and the apparatus prepared, as directed at section 3. The apparatus is then placed on one scale of a balance, together with the other little tube containing the pyrosulite, and exactly weighed.

" The cork of A, is then somewhat raised, to allow the little tube with the manganese to fall into the flask. The evolution of carbonic acid commences immediately, and continues until all the manganese is decomposed. When the operation begins to get on more slowly, the flask A, is placed in boiling water, and allowed to remain there until no more bubbles appear. The little wax-stopper is then removed† from *a*, the flask A, taken out of the hot water, and suction applied to *d*, until the sucked air tastes no longer of carbonic acid. The apparatus, after having been allowed to cool, is wiped dry and replaced in the original scale, where the little tube with the pyrosulite still remains : weights are then substituted for the loss of carbonic acid. The number of centigrammes required, divided by 3, directly indicates the per-centage amount of peroxide of manganese (vide section 32). The centigrammes substituted for the loss of carbonic acid are then removed from the balance, and the little tube with the pyrosulite is thrown into A. (The little wax-stopper must of course previously be replaced on *a.*) If no fresh evolution of carbonic acid takes place, the manganese examined consists of pure pyrosulite, and the experiment is at an end. But should a fresh evolution of carbonic acid take place, the operation must be further conducted and brought to a close, exactly as just stated (vide supra). The apparatus is then replaced on the balance, with an additional weight of three grammes on the same scale. If this is sufficient to restore a perfect equilibrium, no loss of acid has taken place: the manganese, indeed, contains other matters in admixture, but only such as do not consume any acid. But if the scale with the apparatus sinks, this is a certain sign that a portion of the acid has been lost by combining with the oxides which the manganese under examination contains. The number of centigrammes required to restore the perfect equilibrium of the balance, multiplied by 0·6114, immediately indicates how much anhydrous sulphuric acid has been wasted in the decomposition of 100 parts of the manganese under examination. The same number, multiplied by 0·333, indicates the amount of acid wasted in every 100 parts of sulphuric acid employed for the decomposition of the manganese in question. The same number, multiplied by 0·5552, indicates how much anhydrous hydrochloric acid would be wasted in the decomposition of 100 parts of the manganese. The same number, multiplied by 0·333, indicates also how much acid would be wasted in every 100 parts of hydrochloric acid employed for the decomposition of the manganese.

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* " Any variety of pyrosulite will serve this purpose, provided it be free from other manganese ores. If it contains heavy spar, it may be employed directly ; but should it contain alumina or lime, it must be treated first with dilute nitric acid, at a gentle heat, until all soluble parts have been dissolved ; it is then washed and dried. Artificially prepared, hydrated peroxide of manganese may be substituted for pyrosulite."

† " This must of necessity be done while the flask is still standing in the hot water, or else the sulphuric acid will recede upon the apparatus being removed from the hot water."

"These figures result from the following equations:

"I. 275 (eq. of carbonic acid) : 501 (eq. of sulphuric acid) = the carbonic acid obtained *minus* (in proportion to the sulphuric acid used) : x.

x = this carbonic acid × $\frac{501}{275}$, *i. e.* × 1·822.

"Thus, the number obtained for x indicates the amount of sulphuric acid corresponding to the amount of carbonic acid obtained *minus*.

"II. 2·98 of manganese : 100 = x of equation I. : x.

x = x of I. × $\frac{100}{298}$ *i. e.* × 0·33557.

"The x of the first equation tells us how much sulphuric acid has been wasted without contributing to the decomposition of 2·98 grammes of the manganese; the x of the second equation tells us the same for 100 parts of manganese.

"If, therefore, the amount of carbonic acid obtained *minus*, be directly multiplied by the product of the quotients of I. and II.,

1·822 and 0·33557,

i. e. with 0·61141 (the number given above), the amount of anhydrous sulphuric acid wasted in the decomposition of every 100 parts of manganese, will immediately be found.

"III. 5·47 (the amount of sulphuric acid used):

100 = the x of I. : x.

x = the x of I. × $\frac{100}{547}$, *i. e.* × 0·18282.

"Of 5·47 of sulphuric acid, the x of I. has been wasted, 100 corresponds to the x of III.

"The x of III. is, therefore, found directly by multiplying the amount of carbonic acid obtained *minus* with the product of the quotients, 1·822 and 0·18282, *i. e.* = 0·33301.

"The figures for hydrochloric acid are found in the same manner (4·967 of hydrochloric acid must be taken instead of 5·47 of the sulphuric acid)."*

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* *New Methods of Alkalimetry, and of determining the Commercial Value of Acids and Manganese.* By Drs. C. R. Fresenius and H. Will. Edited by J. Lloyd Bullock. pp. 123—128.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

Apr. 26. *Giles Little*, of Fetter-lane, and *Peter Grimmow*, of Vine-court, Spitalfields, for a plaited taper fly line.

27. *Richard Kitchen*, of Sheffield, for an improved corset busk.

29. *Henry Weir Collinson*, of 14, Stamford-street, Blackfriars, for a portable apparatus for shaping hats.

29. *William Glegg Gover*, of 8, Chester-square, Middlesex, for a design for window-sashes.

30. *Green & Bentley*, of 33, Compton-street, Brunswick-square, London, for the Protean reflecting oven.

May 1. *William Dent*, of Newcastle-street, Strand, for a design for an improved urinal.

2. *Joseph Weldin*, of Worcester, for a design for an elastic glove.

3. *Robert Fry*, of Tockington, Gloucestershire, for a design for the configuration of a bed or floor for thrashing grain and seeds, and for breaking stones or other matter.

4. *David Middleton, Jun.*, of Lincoln, for a chimney-pot and cowl-sweeper.

8. *Isaac Suggitt*, of Howden, in the county of York, for a design for a new lamp for burning spirit.

11. *William and Joseph Harcourt*, of 209, Bristol-street, Birmingham, for Harcourt's improved sliding blind pulley.

11. *George Thomas Caswell*, of Wolverhampton, Staffordshire, for a double-acting pump.

11. *Vincent Price*, of Wardour-street, Soho, for a design for a manumotive carriage.

14. *William Warne*, of Lark Hall Lane, Clapham, for a cordwainer's standing or sitting machine.

15. *Benjamin Hick and Son*, of Bolton, Lancashire, for a design for a portable forge.

15. *William Beynon*, of Newhall Works, Birmingham, and Falcon-square, London, for a trousers strap fastening.

15. *H. Negretti*, of 19, Leather-lane, London, for a thermo-hydrometer.

18. *A. Saxon*, of St. George's-road, Manchester, for a design for a tin bobbin.

21. *Walter Mabon*, of Ardwick Foundry, Manchester, for a design for a lubricator.

22. *John and Edward Butler*, of Walsall, for a cigar case.

28. *Thomas Wolferstan*, of Salisbury, for a safety boiler tap.

28. *Henry Chany*, of Clifton-street, Finsbury-square, for a shifting lever ball cock.

28. *H. and T. Merry*, of Birmingham, for a design for a candlestick and shade combined.

List of Patents

Granted for SCOTLAND, subsequent to April 22nd, 1844.

To John Lee, of Newcastle-upon-Tyne, for improvements in obtaining products from sulphurets and other compounds containing sulphur.—Sealed 24th April.

William Scott, of Bolton-street, Piccadilly, for improvements in the manufacture of fuel,—being a foreign communication.—Sealed 24th April.

William Henry Barlow, of Leicester, civil engineer, for improvements in the construction of keys, wedges, or fastenings for engineering purposes.—Sealed 24th April.

John Dixon, of Wolverhampton, iron-master, for improvements in heating air for blast furnaces and for other uses.—Sealed 24th April.

William Wright, of Duke-street, St. James's, London, surgeon, for certain improvements in rendering leather, skins, or hides, impervious to wet, more flexible, and more durable.—Sealed 30th April.

John Mc Intosh, of the city of Glasgow, for certain improvements in revolving engines, and an improved method of producing motive power, and of propelling vessels.—Sealed 30th April.

Samuel Faulkner, of Manchester, cotton spinner, for certain improvements in machinery or apparatus for carding cotton, and other fibrous substances.—Sealed 30th April.

William Irving, of 102, Regent-street, Lambeth, Surrey, for improved machinery and apparatus for cutting and carving substances to be applied for inlaying and other purposes.—Sealed 3rd May.

James Murray, of the Garnkirk Coal Company, in the parish of Cadder, Lanarkshire, for a new method of using and applying artificial gas, made from coal, oil, or other substances, for lighting and ventilating caverns, pits, or mines, or other pits, where minerals or metals are worked or extracted.—Sealed 3rd May.

James Bremner, residing at Pulteney Town, Caithness, civil-engineer, for certain improvements for constructing harbours, piers, and buildings, in water; for cleansing harbours, and for raising sunken vessels.—Sealed 9th May.

John Wilkie, of Glasgow, mechanic, for improvements in machinery or apparatus for working wood into the various forms for making doors, window-shutters, window-sashes, mouldings, flooring, and other purposes.—Sealed 16th May.

New Patents
SEALED IN ENGLAND.
1844.

To William Clarke, of Nottingham, lace manufacturer, for improvements in machinery for manufacturing ornamented bobbin net or twist lace. Sealed 30th April—6 months for inrolment.

William Jeffries, of Little Sussex-place, Hyde Park Gardens, for improvements in sweeping chimneys, and in apparatus to prevent chimneys from smoking. Sealed 30th April—6 months for inrolment.

Robert Gordon, of Heaton Foundry, Stockport, millwright and engineer, for improvements in grinding wheat and other grain, and in dressing flour or meal; which improvements in grinding are also applicable to grinding cements and other substances. Sealed 30th April—6 months for inrolment.

William Fairbairn and John Hetherington, both of Manchester, engineers, for certain improvements in stationary steam-boilers, and in the furnaces and flues connected therewith. Sealed 30th April—6 months for inrolment.

Jacob Samuda, of Southwark Iron Works, engineer, and Joseph D'Aguilar Samuda, of the same place, engineer, for certain improvements in the manufacture and arrangement of parts and apparatus for the construction and working of atmospheric railways. Sealed 30th April—6 months for inrolment.

John Melville, of Upper Harley-street, Middlesex, Esq., for improvements in the construction and modes of working railroads. Sealed 30th April—6 months for inrolment.

James Hayman, of Mount-street, Lambeth, corn-dealer, for an improved construction and arrangement of certain parts of omnibuses and other vehicles. Sealed 30th April—6 months for inrolment.

Robert Corden, of Nottingham, tobacco manufacturer, and Sidney Smith, of the same place, engineer, for improved economical apparatus for making gas for illumination. Sealed 30th April—6 months for inrolment.

John Constable, of Lime-street, merchant, for certain improvements in the manufacture of sugar,—being a communication. Sealed 30th April—6 months for inrolment.

William Colborne Cambridge, of Market-Lavington, Wiltshire, agricultural machine-maker, for certain improvements, first,—in machinery for rolling or crushing ground; second,—for cutting and thrashing agricultural products; and third,—an improved adaptation of horse-power to thrashing machinery, which may also be applied to other uses. Sealed 30th April—6 months for inrolment.

Joseph Wright, of Gough-street, Gray's-inn-lane, coach-builder, for improvements in railway and other carriages,—being a communication. Sealed 7th May—6 months for inrolment.

James Grant, of Vine-street, Westminster, gas-fitter, for improvements in the means of ventilating buildings and other places where a change of air is required. Sealed 7th May—6 months for inrolment.

William Vose Pickett, of Tottenham, Esq., for certain methods of preparing, in metals or other substances, the parts and features of architectural construction and decoration, and for applying the same in the construction and arrangement of houses and other buildings. Sealed 7th May—6 months for inrolment.

John Loach, of Birmingham, manufacturer, for a certain improvement in corkscrews, which improvement is also applicable to cocks, or taps and valves.—Sealed 7th May—6 months for inrolment.

Alfred Toy and Edward Hanson, of Castle-street, Holborn, lamp manufacturer, for improvements in consuming tallow and other fatty matters in lamps.—Sealed 7th May—6 months for inrolment.

Charles Watterson, of Manchester, soap manufacturer, for certain improvements in the manufacture of soap. Sealed 8th May—6 months for inrolment.

Thomas Grimsley, of Oxford, sculptor, for a new method of constructing a self-supporting fire-proof roof, and other parts of buildings, with bricks and tiles formed from an improved machine. Sealed 14th May,—2 months for inrolment.

John Browne, of New Bond-street, Esq., for improvements in apparatus for protecting the human face, or part of the human face, from the inclemency of the weather, part of which improvement is applicable to protect birds in cages. Sealed 14th May—6 months for inrolment.

Edward Hill, of Harts Hill, Worcester, iron manufacturer, for improvements in the manufacture of railway and other axles, shafts, and bars. Sealed 14th May—6 months for inrolment.

William Walker, Jun,, of Brown-street, Manchester, hydraulic engineer, for improvements in warming and ventilating apartments and buildings. Sealed 15th May—6 months for inrolment.

William Palmer, of Sutton-street, Clerkenwell, manufacturer, for improvements in the manufacture of wicks for candles, and for lamps, and in the manufacture of candles. Sealed 15th May—6 months for inrolment.

Hesketh Hughes, of Chiswell-street, Gent., for an improved machine for crimpling, fluting, and quilling, muslin and other fabrics. Sealed 15th May—6 months for inrolment.

Charles Hancock, of Grosvenor-place, Esq., for certain improvements in cork and other stoppers, and a new composition or substance which may be used as a substitute for, and in preference to, cork; and a method or methods of manufacturing the said new composition or substance into bungs, stoppers, and other useful articles. Sealed 15th May—6 months for inrolment.

Peter Armand Le Comte de Fontainemoreau, of Skinners-place, Sise-lane, London, for a new and improved mode or method of paving and covering roads and other ways or surfaces,—being a communication. Sealed 15th May—6 months for inrolment.

Henry Holmes, of Derby, cutler, for improvements in the manufacture of bricks, tiles, and other plastic substances. Sealed 15th May—6 months for inrolment.

John Mc Intosh, of Glasgow, Gent., for certain improvements in revolving engines, and an improved method of producing motive power, and of propelling vessels. Sealed 17th May—6 months for inrolment.

James Pilbrow, of Tottenham, civil engineer, for certain improvements in the machinery for, or a new method of, propelling carriages on railways and common roads, and vessels on rivers and canals. Sealed 17th May—6 months for inrolment.

George Gwynne, of Princes-street, Cavendish-square, Gent., and George Fergusson Wilson, of Belmont, Vauxhall, Gent., for improvements in treating certain fatty or oily matters, and in the manufacture of candles and soap. Sealed 20th May—6 months for inrolment.

Thomas Martin, of Withybush, Pembrokeshire, for certain improvements in the construction of slated roofs, flats or floors, tanks or cisterns, or reservoirs for water, and in pipes, tubes, or channels, of the same materials, for the conveyance of water. Sealed 22nd May—6 months for inrolment.

James Petrie, of Rochdale, Lancashire, engineer, for certain improvements in steam-engines. Sealed 22nd May—6 months for inrolment,

James Perkins Catten, of St. Martin's-court, Gent., for improvements in the manufacture of dead eyes, for the purpose of setting-up the rigging of ships and other sailing vessels. Sealed 22nd May—6 months for inrolment.

James Bremner, residing at Pulteney Town, Caithness, civil engineer, for certain improvements in constructing harbours, piers, and buildings, in water; for cleansing harbours, and for raising sunken vessels. Sealed 22nd May—6 months for inrolment.

Joseph Meeûs, of Ludgate-hill, for certain improvements in weaving, and in weaving-machines. Sealed 22nd May—6 months for inrolment.

John Henry Moor, of Lincoln's-inn-fields, Gent., for certain improvements in the construction of carriages generally. Sealed 23rd May—6 months for inrolment.

William Johnson, of Bury, Lancashire, agent, for improvements in machinery or apparatus for preparing cotton, wool, flax, and other fibrous substances. Sealed 23rd May—6 months for inrolment.

John Wilkie, of Glasgow, mechanic, for improvements in machinery or apparatus for working wood into the various forms required for making doors, window-shutters, window-sashes, mouldings, flooring, and other purposes. Sealed 23rd May—6 months for inrolment.

Richard Wilson, of Newcastle-upon-Tyne, builder, for improvements in the manufacture of tiles. Sealed 23rd May—6 months for inrolment.

John Taylor, of Duke-street, Adelphi, Gent., for certain new mechanical combinations, by means of which, economy of power and of fuel are obtained in the use of the steam-engine. Sealed 23rd May—6 months for inrolment.

William Archibald Cooper, of New Mills, Derby, Gent., for certain improvements in machinery for spinning cotton, wool, and other fibrous substances. Sealed 23rd May—6 months for inrolment.

William Augustus Guy, of Bloomsbury-square, Bachelor of Medicine, for certain improvements in ventilation. Sealed 25th May—6 months for inrolment.

Charles Low, of Robinson's Row, Kingsland, for certain improvements in the making or manufacturing of iron and steel. Sealed 25th May—6 months for inrolment.

CELESTIAL PHENOMENA FOR JUNE, 1844.

D.	H.	M.	
1			Clock after the sun, 2m. 28s.
	—		☽ rises 9h. 3m. A.
	—		☽ passes mer. Morn.
	—		☽ sets 4h. 3m. M.
			Occul. Sagittarii, im. 15h. 37m. em. 16h. 11m.
			Occul 33 Sagittarii, im. 9h. 35m. 10h. 37m.
			Occul. x_2 Sagittarii, im. 11h. 32m. em. 12b. 20m.
3	8	38	☿ in conj. with Juno, diff. of dec. 4. 40. N.
4	9	51	♄ in conj. with the ☽ diff. of dec. 4. 56. S.
			Occul. z^1 Aquarii, im. 15h. 30m. em. 16h 16m.
			Occul. z^2 Aquarii, im. 16h. 5m.
5			Clock after the sun, 1m. 50s.
	—		☽ rises 11h. 26m. A.
	—		☽ passes mer. 3h. 57m. M.
	—		☽ sets 9h. 3m. M.
6			Occul. ϰ Aquarii, im. 13h. 29m. em. 13h. 41m.
7	8	29	☽ in □ or last quarter
			Occul k^2 Piscium, im. 14h. 48m. em. 15h. 45m.
8			♃ in conj. with the ☽ diff. of dec. 6. 45. S.
9	1	38	♅ in conj. with the ☽ diff. of dec. 6. 2. S.
	12	17	☿ stationary
	13	33	♃'s second sat. will em.
10			Clock after the sun, 0m. 53s.
	—		☽ rises 0h. 23m. M.
	—		☽ passes mer. 6h. 59m. M.
	—		☽ sets 1h. 48m. A.
12	14	25	Vesta stationary
	16		☽ in Apogee
13	14	29	♃'s fourth sat. will em.
13	19	59	☿ in conj. with ☽ diff. of dec. 5. 7. S.
14	12	44	♃'s first sat. will im.
15			☉ eclipsed, invis. at Greenwich
	—		Clock after the sun, 0m. 9s.
	—		☽ rises 3h. 15m. M.
	—		☽ passes mer. 11h. 35m. M.
	—		☽ sets 7h. 54m. A.
16	0	26	Ecliptic conj. or ● new moon
16	3	33	♀ at greatest brilliancy
	13	30	♃'s second sat. will im.
	21	20	♂ in conj. with the ☽ diff. of dec. 3. 29. N.
17			Mercury R. A. 4h. 16m. dec. 17. 16. N.
	—		Venus R. A. 8h. 31m. dec. 20. 3. N.
	—		Mars R. A. 6h. 49m. dec. 24. 0. N.
	—		Vesta R. A. 20h. 47m. dec. 19. 27. S.
	—		Juno R. A. 4h. 53m. dec. 13. 50. N.
	—		Pallas R. A. 15h. 32m. dec. 25. 40. N.
	—		Ceres R. A. 15h. 33m. dec. 14. 52. S.
	—		Jupiter R. A. 0h. 9m. dec. 0. 23. S.
	—		Saturn R. A. 20h. 36m. dec. 19. 7. S.
	—		Georg. R. A. 0h. 23m. dec. 1. 44. N.
	—		Mercury passes mer. 22h. 31m.
	—		Venus passes mer. 2h. 48m.
	—		Mars passes mer. 1h. 6m.
	—		Jupiter passes mer. 18h. 22m.
	—		Saturn passes mer. 14h. 50m.
	—		Georg. passes mer. 18h. 37m.
18	23	40	♀ in conj. with the ☽ diff. of dec. 5. 16. N.
20			Clock before the sun, 1m. 13s.
	—		☽ rises 8h. 31m. M.
	—		☽ passes mer. 3h. 31m. A.
	—		☽ sets 10h. 28m. A.
	12	9	☿ greatest Hel. Lat. S.
	20	46	☉ enters Cancer,— Summer commences
21	14	38	♃'s first sat. will im.
22	13	50	♃'s third sat. will em.
22	15	3	☿ greatest elong. 22. 8. W.
23			Pallas in conj. with Ceres, diff. of dec. 40. 14. N.
	3	24	☽ in □ or first quarter
	13	6	♃ in □ with the ☉
24	9	15	♀ in the descending node
25			Clock before the sun, 2m. 18s.
	—		☽ rises 2h. 53m. A.
	—		☽ passes mer. 7h. 42m. A.
	—		☽ sets Morn.
27	9		♅ in conj. with the ☉
28	2		☽ in Perigee
29	14	40	♃'s third sat. will im.
30	5	4	♀ stationary
	6	17	Ecliptic oppo. or ○ full moon

J. LEWTHWAITE, Rotherhithe.

THE

LONDON JOURNAL

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No. CLI.

RECENT PATENTS.

To George Parsons, *of West Lambrook, in the county of Somerset, Gent., and* Richard Clyburn, *of Uley, in the county of Gloucester, engineer, for their invention of certain improvements in machinery for beating, cleansing, and crushing various animal and vegetable materials or substances.*—[Sealed 10th July, 1843.]

This invention consists, Firstly,—in peculiar arrangements and constructions of machinery, applicable to the beating and cleansing of wool, cotton, flax, silk, hair, and other fibrous animal or vegetable substances that may be required to be opened, and separated from dust and other extraneous matters; the essential novel feature of which machinery is the employment of conical rotating fans or beaters; such fans or beaters being made to revolve within a conical case, and between which case and the rotating fans or beaters, the wool, cotton, or other material, intended to be cleansed, is introduced. And this machine, under certain modifications, is also applicable to the purposes of beating or thrashing wheat, oats, pease, beans, and other grain or seeds, and separating the straw, stalks, husks, and other extraneous matters therefrom.

Secondly,—the improvements consist in a peculiar apparatus, designed for cleansing or separating corn or other grain from chaff, inferior seeds, or other matters requiring to be extracted therefrom. The novelty of this part of the invention is, the employment of a rotary fan or blower, of a peculiar form or construction, by which the air is caused to pass through the machine in the direction of the axis of the fan; and the essential character of such fan or blower consists in so forming the vanes thereof that they shall be of greater radii on that side of the fan where the air is discharged than on the side at which it is admitted.

Thirdly,—the improvements consist in machinery applicable to the crushing of oats, beans, malt, and other vegetable or animal substances which may be required to be broken or crushed; the peculiar novel feature of which machinery consists in the employment of a pair or several pairs of rollers, having flutes or grooves formed round their peripheries parallel to the ends of such rollers.

The first head of this invention is shewn in Plate XVI., at figs. 1, 2, and 3. Fig. 1, is a plan view of a machine adapted to the purposes of opening and cleansing wool, cotton, flax, hair, or other such substances; the outward cone and its casing being removed, the better to shew the interior arrangement of the various parts. Fig. 2, is a vertical section, taken in the line A, B, of fig. 1; and fig. 3, is a partial side elevation of the machine, shewing the conical casing, with its cover, and the feeding and exit passages. The form in which the rotary conical fans or beaters, and their corresponding conical case, are made, when applied to the purposes of cleansing wool, cotton, flax, hair, or other such substances, is that of a double cone, as shewn in fig. 1. The mode adopted in constructing them is as follows:—In forming the conical case, a series of rings of wood *a, a, a,* are mortised into longitudinal ribs *b, b*; which ribs are held together by screw bolts, as shewn in the drawing. There are also other longitudinal ribs *c, c, c,* into which the rings *a, a, a,* project, in order to keep them firmly in their proper position. To the inside of the rings *a, a, a,* are nailed, or otherwise attached, sheets of wire gauze or perforated metal *d, d.* The conical case is open for the admission of air at the smaller end, but closed by means of a board *e,* at the larger end thereof: at the smaller end is also formed an opening at E, for the purpose of introducing the material to be operated upon, (seen best in fig. 2); and at the larger end another opening, F, for the exit of the cleansed material. The conical revolving fans, or beaters, consist of sheets of metal *f, f,* placed upon rings *f*, f*,* (of varying diameters,) which rings are mounted upon an axle *g.* These sheets of metal *f,* are turned up from the peripheries of the rings *f*, f*,* as at *h, h;* and behind the parts so turned up, strips of wood *i, i,* are placed, and secured thereto by means of screws. The casing, constructed as above, is placed upon the framework *k, k,* to which it is securely attached in any convenient manner, and closed in from the air at its lower parts by boards *l, l,* as shewn in the drawing. Within the conical casing are then placed the rotary conical fans or beaters, the axis of which should be placed excentrically to the centre of the conical case, as shewn in the drawings.

Motion is communicated to the revolving fans from any suitable motive power, by means of the strap *m,* and pulley *n.* Upon the axle of the fans or beaters is another pulley *p,* provided with a strap, which passes around a revolving pulley *q,* upon the axle of which latter pulley is a pinion *r,* to communicate motion, through the intervention of the train of wheels and pinions shewn in the drawing, to the rollers *s, s, t, t,* and *u.* The roller *u,* is mounted in bearings formed in a sliding frame *v,* and around it is placed an endless travelling apron *w,* which apron passes in like manner around another roller *u*;* the rollers *s,* and *t,* are mounted in slots formed in the sliding frame *v, v,* and the upper one of each pair is pressed down upon the lower one by means of weighted levers *s*, s*, t*, t*,* (see fig. 2.) To each side of the under part of the frame *v, v,* a screw box *x,* is attached, and in it is placed a screw pin *y;* which pin turns in a socket formed in the stationary framework. By this arrangement, on turning the pins *y,* the sliding frame *v,* and with it the rollers *s, t, u,* and *u**, together with the feed-apron *w,* will be moved nearer to or further from the conical rotating fans or beaters.

At the end of the sliding frame *v, v,* is placed a serrated piece of metal *z,* which is attached thereto, and consequently moves backwards or forwards therewith. In order to prevent the dust and other extraneous matter from flying about, a cover I, I, is placed around the upper part of the conical case, and attached at bottom to the stationary framework.

The wool, cotton, or other material to be operated upon, is placed upon the endless apron *w, w,* which, travelling as before described, carries the material forward between the two pairs of feed-rollers *s,* and *t,* and thus introduces it between the rotating conical fans or beaters and their conical case; in which situation it is beaten and driven forward in a spiral direction to the larger ends of the cones, the increased centrifugal force produced by the rotation of the conical fans or beaters carrying it in this direction; such revolution causing at the same time a strong current of air to pass through the conical casing, and drive the wool, cotton, or other material through the aperture F, into a chamber or other receptacle placed to receive it. The material on first entering the machine is struck by the rotating fans or beaters against the serrated piece of metal *z*; which operation opens the hard locks, and renders it in a lighter state to be subsequently acted upon by the further revolution of the fans or beaters; during which the dirt and other heavy extraneous matter is separated from the material under operation, and falls through the wire gauze *d, d,* of the conical case on to the floor beneath.

Figs. 4, 5, 6, and 7, shew the above machine modified for the purpose of beating or thrashing and cleansing wheat, oats, peas, beans, and other grain or seeds, and separating the straw, stalks, husks, and other extraneous matters therefrom. Fig. 4, is a top view of the machine complete; fig. 5, a longitudinal vertical section, taken in the line A, B, of fig. 4; and fig. 6, a horizontal section, taken in the line C, D, of fig. 5.

The revolving fans or beaters are mounted upon an axle *g,* and supported by rings *f, f,* and consist of strips of wood *i, i,* and metal flanges *h, h,* as before described. In this instance, however, they are formed as a simple cone, instead of the double conical shape of that first described. The conical case is in this instance constructed of metal rings *a, a,* at each end, and at the centre thereof; to which metal rings a series of longitudinal bars *d, d,* are attached, by means of screw-bolts; sufficient space being left between these bars to allow the corn or other grain to drop through, when beaten or thrashed from the straw or stalk. A portion of the bars *d, d,* are removed at E (fig. 5), in order to form an opening for the admission of the material to be operated upon; and it will be perceived, by reference to fig. 6, that the smaller end of the conical case is closed, but that an annular opening is left at the larger end for the exit of the beaten or thrashed straw or stalks. To the rings *a, a,* a metal cover I, is fastened, which cover is closed at both ends, and has an opening formed in it at G, G, for the purpose of allowing the corn or other grain, which has been beaten from the straw or stalks, to descend to any required receptacle. The conical casing is attached by means of bolts to the framework *k, k,* of the machine; which framework is closed on its sides by boarding. The feed-board is shewn at H, mounted upon the upper part of the framework, and extending to the inner edge of the conical case, as shewn at fig. 5. Motion is communicated to the conical fans or beaters by means of a strap, passing over the pulley *n*; and it may be driven, as shewn in the drawings, by another larger pulley, turned by manual labor, or by steam, or other motive power. It will be perceived, by reference to the several figures, that the conical fans or beaters are, as before, also placed excentrically to the centre of the conical case; but, in this instance, the line of excentricity is about at right angles to the line of direction at which the machine is fed. The corn or other material to be beaten or thrashed is placed lengthways upon the feed-board H; when, on rotary motion being communicated to the machine, it will be whirled onward to the larger end in a spiral direction, by the conical fans or beaters, and beaten or thrashed against the bars D, D, of the conical casing; the straw or stalk leaving the machine by the opening shewn at I, I (fig. 6); the separated corn or other grain, with a portion of the chaff, dropping between the bars *d, d,* on to the spout or shute J, J, and from thence is received in any required receptacle; during which the current of air generated by the revolution of the conical fans or beaters, proceeding in the direction of the arrow in fig. 5, will carry forward the chaff, and other light loose material, out at the back end of the machine, as at K; at the same time, also, those seeds which are light or injured will be carried by the current of air a short distance, and fall into the spout or shute L, L, and be conveyed out at the side of the machine. If desired, the conical case may be closed at both ends, and have an aperture formed in its periphery, for the exit of the straw or stalks. Fig. 7, represents another mode which may be adopted in constructing the conical casing; in this instance a series of wooden rings *a,* are held together by longitudinal strips *b,* through which are passed a series of annular wires *d, d,* with spaces between for the escape of the beaten or thrashed corn or other grain.

The second head of the invention, viz. the apparatus for cleansing or separating corn or other grain from chaff, inferior seeds, or other matters required to be extracted thereform, is shewn at figs. 8, 9, 10, 11, and 12. The improved form of fan employed in this machine is shewn detached at figs. 8, and 9; the former being a front elevation thereof, and the latter a plan or horizontal view. It consists of a series of vanes or wings *a, a,* supported by arms extending from an axle *b*; which arms are placed at an angle to the axle, as will be perceived by inspecting fig. 9. This angle may vary considerably, but an angle of about 45° has been found to answer the purpose best. The vanes or wings *a, a,* are formed parallel from their inward ends to the points *c, c,* at which places they are curved, in order that the vanes or wings may be of increasing diameter; but they may be made straight, if desired.

Fig. 10, is a side elevation of a machine for cleansing or separating grain from inferior seeds or other extraneous matter, with the improved blower applied; fig. 11, is a longitudinal vertical section; and fig. 12, an end or front view of the same. The framework of the machine is shewn at *d, d,* boarded in at the sides like an ordinary winnowing-machine. The improved fan or blower is shewn at *a, a,* mounted upon its axle *b, b,* which turns in bushes *c, c.* The axle *b,* is provided with a small pulley *f,* over which a driving-strap passes, and from thence around the drum *g;* on turning which, by means of the handle *h,* the fan or blower is caused to revolve with considerable rapidity. It will be perceived, by reference to the several figures, that the fan or blower is partially enclosed by the front framing of the machine, as at *d*, d*;* such part of the framing extending inwards to the commencement of the conical or curved portions of the several vanes. On motion being communicated to the fan or blower, as above described, or by any motive power, the air will be caused to rush into the cased chamber *i,* of the machine, in the direction of the arrows (fig. 11), and, owing to the peculiar form of fan or blower, a much greater depth of blast is obtained than can be produced by the rotation of those of the ordinary construction.

In order to prevent a vacuum being formed at the centre of the fan or blower, a channel A, open to the atmosphere and the interior of the machine at B, (that part nearest the fan,) is adopted.

To the top of the framing of the machine is attached a hopper *k,* at the bottom of which is mounted a revolving feed-roller *l;* which roller has grooves formed in its periphery, as shewn in the drawing. Within the hopper is also placed a sliding board *m,* capable of being raised or lowered by means of the screw *n.* Upon the axle of the feed-roller is mounted a bevilled wheel *o,* taking into a similar pinion *p,* mounted upon a short auxiliary shaft *q;* upon which shaft is also affixed a pulley *r,* around which a strap is passed, and from thence around another pulley *s,* mounted upon the shaft *g*,* of the drum *g;* hence, on motion being communicated to the rotary fan or blower, the feed-roller will be caused to revolve, and, by means of its grooves, carry the seed and extraneous matter out of the hopper *k,* and cause it to fall through the blast generated by the rotation of the fan or blower, as above described. The seed and extraneous matter, so falling, will be separated by the current of air (passing in the direction of the arrows) according to the specific gravity of its several particles.

The mode preferred for collecting such divisions is as follows:—Under the feed-roller *l*, is placed a riddle *t*, formed with a woven wire bottom, in the ordinary way. At each end of this riddle are pins *u*, *u*, which move to and fro within sockets attached to the casing of the machine. Upon the axis of the drum *g*, is mounted an excentric *u*, which excentric is connected by means of a connecting rod *v*, to the vibrating lever *w*, which lever is affixed to a short shaft *x*, turning in suitable bearings; hence, by the revolution of the axle of the drum *g*, the shaft *x*, is caused to rock backwards and forwards. To one end of the shaft *x*, is attached a lever *y*, which lever is connected by means of a jointed rod to one end of the riddle *t*; by which arrangement the riddle will have a backward and forward motion communicated thereto.

Under the riddle *t*, a box *z*, is formed, having an aperture 1, therein; and under this aperture a spout or shute 2, is situated; which spout or shute is intended to convey the seed, which passes through the riddle *t*, on to the inclined spout or shute 3, 3. The spout 3, is mounted upon a centre pin, and has a vibrating motion communicated thereto by the following means:—At the reverse end of the shaft *x*, to the lever *y*, is affixed another lever 4, 4, which is connected by means of a jointed rod to the spout or shute 3; hence, as the shaft vibrates, by the means before described, a reciprocating motion will be communicated thereto.

The action of the machine is as follows:—The corn or other seeds placed in the hopper *k*, drop, as before described, through the blast which is proceeding in the direction of the arrows, and fall in their progress upon the riddle *t*; the chaff, dust, and other light extraneous matter being separated therefrom and carried away by the current of air through the end of the machine; the corn or other seeds then pass through the riddle *t*, into the box or chamber *z*, and from thence through the aperture 1, between which and the spout 2, they again meet a current of air generated by the blower; the heavier seed will then fall through the spout 2, on to the vibrating spout 3, and from thence be conveyed to any desired position.

During the fall of the corn through the second current of air, a separation will take place between the inferior and better sorts; those of the former class, being lighter, will be carried by the blast beyond the spout, and fall into the channel 6, and from thence down the spout 7, into any desired receptacle.

It will be perceived that the riddle *t*, is open at its sides to the current of air, which will consequently impinge upon the seed that lies thereon, and thus carry off the "pugs" or unthrashed ears, which will then fall into the spout 8, and pass out of the machine. The upper parts of the sides of the spouts 7, and 8, are capable of turning upon centre pins 9, 9, into the positions shown by dots in fig. 11, so that, if desired, the distance between the chambers 6, and 8, may be altered at pleasure; and there are a series of holes formed in the side casings of the machine, in which pins are placed, in order to retain the jointed pieces of the chambers in the required position.

The third head of the invention, viz. the improved machine for crushing oats, beans, malt, and other vegetable or animal substances, is shewn at figs. 13, and 14; fig. 13, being a longitudinal vertical section, and fig. 14, a partial plan of the machine. *a, b,* are the crushing-rollers, having grooves formed on their peripheries, the projections on the one extending into the spaces of the other. The substance to be crushed is to be placed between this pair of rollers, and rotary motion communicated thereto, when the material will be drawn down between the grooves of the rollers, and the requisite crushing effected.

The rollers *a, b,* are connected together by means of a toothed pinion *c,* and wheel *d*; and are mounted in suitable bearings; those of the larger one *a,* are attached to the framework *e, e,* of the machine; and the bearings *f, f,* of the smaller roller *b,* are affixed to a v-shaped sliding frame *g, g,* which is capable of moving to and fro in guides *h, h,* formed on the framework of the machine. At the bottom of the sliding frame *g, g,* an ear or lug *i,* is formed, having a female-screw formed therein, which screw is operated upon by a screw-pin *k,* which turns in a socket formed in the end framing of the machine. By turning the pin *k,* the sliding frame *g, g,* will, therefore, be caused to recede or advance, carrying with it the smaller crushing-roller *b, b,* and thus increase or decrease the space between it and the larger one, in order to regulate the degree of crushing requisite for different materials. A ratchet-wheel *l,* is fixed on the outward end of the screw pin *k,* into one of the spaces of which a pall *m,* is placed, in order to prevent the screw pin *k,* from turning round when the rollers are adjusted to the required degree of proximity; *n, n,* is a hopper, into which the corn or other material to be crushed is placed. The upper part of this hopper is constructed of wood, and the lower part thereof, which is of iron, is bolted to the sliding frame *g, g.* At the lower part of the hopper *n, n,* a feed-roller *o,* (fig. 13,) is placed, having upon its periphery a series of grooves, which receive the seed, and deliver it (by the revolution thereof) on to the crushing-rollers below. Within the hopper is also placed a brush *p, p,* the lower end of which extends downwards to the feed-roller *o;* from the brush *p, p,* a nut *q, q,* extends, sliding in a grove formed in the hopper, to the outward end of which nut a small screw *r, r,* is connected, by turning which the brush *p, p,* will be raised or lowered in order to regulate the quantity of seed or other material which shall be delivered by the feed-roller *o.* Upon the axle of the smaller crushing-roller *b, b,* a fly-wheel *s, s,* is mounted, to one of the arms of which a handle *t,* is attached, by turning which the roller will be caused to revolve, carrying with it, by means of the pinion *c,* and toothed wheel *d,* the larger crushing-roller *a, a.* On the axis of the fly-wheel shaft is also mounted a pinion *u,* which takes into another pinion *v,* attached to the axle of the feed-roller *o;* by which arrangement it will be perceived that on motion being communicated to the machine, by means of the winch handle *t,* the crushing-rollers *a, b,* and feed-roller *o,* will be caused simultaneously to revolve; the adjustable brush *p,* regulating the quantity which the feed-roller shall supply to the crushing rollers below. The material, when crushed, falls on to a spout *w*, and from thence into any required receptacle below.

In order to prevent the escape of the material at the sides of the rollers, projecting flanges *x*, *x*, are formed around the larger roller *a*; which flanges revolve in contact with the sides of the smaller roller *b*. *y*, *y**, are scrapers, having teeth formed at their edges similar in shape to the grooves upon the crushing-rollers, for the purpose of preventing any accumulation of the crushed material; the teeth of these scrapers are placed in the grooves, so as to press slightly against the surfaces thereof; the scraper *y*, of the smaller crushing-roller is attached to the sliding frame *g*, and consequently, on the adjustment of the crushing-roller, moves therewith, thereby retaining its proper relative position. The scraper *y**, of the larger crushing-roller is shewn as attached to the spout *w*.

The patentees also shew a modification of this machine, adapted to the crushing of apples and pears, previously to their being pressed for the purpose of obtaining cyder or perry. The crushing-rollers are mounted in suitable bearings, the smaller one being capable of adjustment, as before, by means of a sliding frame *g*. In this case, however, the flutes should be much coarser than when they are applied to the crushing of oats or other grain. A pair of additional rollers, such as are commonly used for breaking oil-cake, and for other purposes, are placed above; these additional rollers are caused to revolve by any suitable gearing. The apples or pears to be crushed are placed in a hopper, and are, by the revolution of the rollers, broken into pieces, to be further operated upon by the improved form of crushing-rollers, between which they are conducted by means of a spout, and subsequently, together with the juice, fall into any required receptacle below. By this operation, a more perfect crushing of the fruit and kernels is attained than by the ordinary process.

The improved crushing-rollers are likewise proposed to be employed for breaking the outward skin or rind of flax. Above the smaller roller is an endless apron, travelling around rollers, which receive rotary motion in any convenient manner; upon this apron the flax to be broken is placed in an even thin stratum, and, as the apron travels onwards, the flax is carried forwards, and falls over between the crushing-rollers, which, as they revolve, break it to the degree required.

Although the grooves in the cylinder are shewn as smooth upon their edges, the patentees do not confine themselves thereto, as, if desired, they may be roughed or ribbed, either parallel to or at an angle to their axes. It will also be evident to all competent mechanics, that the arrangement of parts for supplying the material to be operated upon, and the methods of giving motion thereto, may be varied considerably, and that other substances, such as coffee, rice, bones, &c., may be crushed by the improved rollers with advantage.

The patentees claim, Firstly,—the beating and cleansing of wool, cotton, flax, hair, and other fibrous animal or vegetable substances that may be required to be opened and separated from dust or other extraneous matters; and also the beating or thrashing of wheat, oats, peas, beans, and other grain or seeds, and separating the straw, stalks, husks, or other extraneous matter therefrom, by the employment of conical rotating fans or beaters; such fans or beaters being made to revolve within a conical case, and between which case and the rotating fans or beaters the material intended to be operated upon is introduced. Secondly,—the cleansing or separating of corn, or other grain or seeds, from chaff, inferior seeds, or other matters to be extracted therefrom, by the employment of a rotating fan or blower, the vanes thereof being so formed that they shall be of greater radii on that side of the fan where the air is discharged than on that side at which it is admitted; the air in such case being admitted and discharged in a line with the axis of the said fan or blower. Thirdly—the crushing of oats, beans, malt, apples, flax, and other vegetable or animal substances which may be required to be broken or crushed, by the employment of a pair or pairs of rollers, having flutes or grooves formed round their peripheries parallel to the ends of such rollers.—[*Inrolled in the Petty Bag Office, January,* 1844.]

Specification drawn by Messrs. Newton and Son.

To RICHARD GARRETT, *of Leiston Works, near Saxmundham, in the county of Suffolk, agricultural implement-maker, for his invention of improvements in machinery for drilling, thrashing, and cutting agricultural produce.* —[Sealed 25th November, 1843.]

THIS invention relates, Firstly,—to an improved arrangement of parts, constituting a "drop drill," by means of which seed and manure may be dropped at intervals, and a sufficient quantity of mould covered over the manure before the seed is deposited upon it. In this improved drill, the various parts are so arranged that patches of manure are dropped at proper intervals, say ten inches, or any other suitable distance, apart, and the seed is deposited, at the same intervals, on the patch of manure which has been previously dropped, and covered with mould, by means of a fork or rake, before depositing the seed.

In Plate XVI., fig. 1, represents a side elevation of an improved drill, the outer running-wheel being removed, in order that the working parts may be more clearly seen. *a, a,* are pipes, down which the manure is fed, in proper quantities, by means of the peculiarly shaped scoops, which are seen detached at fig. 2. The lower end of the lowest manure-pipe is closed by a table *b*, which is fixed in any convenient manner to the coulter *c*, an opening b^1, being left between the coulter and the table, as seen in the sectional view, fig. 3; and as the manure descends it falls on to the table *b*, from whence it is pushed off and down through the opening b^1, on to the ground, by means of a vibratory or reciprocating action, which is communicated to the lowest manure-pipe *a*, from the excentric *d*, on the shaft $d*$, through the intervention of the connecting-rod *e*. Various modes of communicating the required motion to the manure-pipe may be suggested; as for instance, that shewn at fig. 3, in which a lever and tappet is employed in place of the excentric or crank. By the tappet raising the end of the lever *e*, the manure-pipe is drawn into the position shewn in that figure, and the patch of manure that has been dropped on to the table is pushed off through the opening b^1. When the tappet passes the end of the lever, and allows the latter to descend, the manure-pipe falls back into its original quiescent position, (as shewn by dots,) ready to receive a fresh supply of manure. Immediately behind the manure-pipe a fork *f*, is mounted, for the purpose of covering the manure over with mould, previously to the seed being deposited thereon. The seed-pipes are shewn at *g, g*; they are supplied with seed in the ordinary manner by cups, and the lower pipe is furnished with a valve *h*, seen best in the detached fig. 4. This valve is a cylinder, with a portion of its circumference cut away, so as to form a recess for containing the seed; the axle thereof is cranked, and is worked backwards and forwards by means of the rod *h**, which is connected either to the manure-pipe *a*, or the rod *e*. The seed-pipe is preceded by a coulter *i*, and followed by a small harrow, for covering over the seed. The implement used for this purpose is a small chain harrow, as shewn in the drawing. The requisite motions are communicated to this part of the apparatus by means of a spur-wheel *j*, on the nave of the running-wheel; this wheel *j*, gears into a smaller wheel *k*, which is mounted loosely on one end of an intermediate shaft *n*. Immediately behind the wheel *k*, (see detached view, fig. 5,) a ratchet-wheel *o*, is firmly keyed on to the shaft *n*, and a catch or click *p*, on the back of the wheel *k*, takes into the teeth of the ratchet-wheel; and when the drill is going forward, the continuous rotation of the wheel *k*, with its click, in one direction, causes the ratchet-wheel to revolve; but when the drill is backed, the click on the wheel *k*, slides over the teeth of the ratchet-wheel, and does not communicate any motion thereto, consequently the parts actuated by this part of the apparatus remain in a quiescent state. The shaft *n*, carries, at its other end, a large wheel *l*, which gears into and drives a pinion *m*, on the shaft *d**, and, by means of excentrics, cranks, or tappet-levers, actuates the other parts, as above mentioned. In place of making the cill *q, q,* (which supports certain parts of the apparatus) of wood, the patentee proposes to construct it of cast-iron, for greater strength and durability. Figs. 6, and 7, represent a side elevation and plan or horizontal view of the iron cill, detached.

The peculiar feature of novelty claimed under this head of the invention is, dropping the seed and manure down separate pipes, at intervals, in any required quantity, and covering the manure, thus dropped, with soil before the seed is deposited upon it.

The second head of the invention relates to machinery for thrashing or beating out grain or seeds. In the ordinary thrashing-machines, the beating-cylinder is generally made either of wood, or wood covered with sheet-iron; but both of these constructions are liable to derangement, from stones or other hard substances being occasionally introduced, by accident, into the machine. In order to obviate this evil, the patentee constructs the cylinder of iron, and thereby imparts increased strength and durability to the machine.

Fig. 8, represents a longitudinal elevation of the drum of a thrashing-machine, constructed on this improved plan, part of the circumference being cut away, in order to shew the interior construction; and fig. 9, is a transverse section of a portion of the machine, shewing the drum in its working position. The drum or beating-cylinder is constructed, for the most part, of iron; *a, a,* is the longitudinal shaft or axle, upon which it is mounted; *b, b,* are circular cast-iron discs, to the face of which segments of wood *c, c,* are affixed, and to which the periphery of the drum, consisting of plates of thin sheet iron, is firmly nailed. The cast-iron discs *b, b,* impart great strength to the cylinder, and are furnished with projecting pieces or ears *d, d, d,* in which recesses are made for receiving longitudinal slips of wrought iron, *e, e.* The junctions of the plates of sheet iron are situated between these strips *e, e,* and the beaters *f, f,* which also consist of strips of wrought iron, and are placed longitudinally along the drum, and immediately above the junctions of the plates; the several parts, viz., the beaters *f*, the iron plates which form the outside of the drum, the strips of iron *e*, and the projecting pieces or ears *a*, are all firmly bolted together, as seen in the drawing. The drum is mounted and driven, and the machine fed in the ordinary manner.

In reference to this part of the invention, the patentee claims constructing the drum or beating cylinder of thrashing machines of iron, as above described.

The third part of the invention consists in an improved arrangement of parts constituting a chaff-cutting engine. Fig. 10, represents a side view of the improved chaff-cutting engine; fig. 11, a front view; fig. 12, a plan view; and fig. 13, a partial longitudinal section of the same. *a, a*, is the framework of the engine; and *b, b*, the fly-wheel, mounted in front of the mouth of the machine, and furnished with two cutting knives *c, c*, which are firmly bolted thereto. The material to be cut into chaff is fed forward by the fluted rollers *d, d*, (fig. 12,) which have an intermittent motion communicated to them by means of the clicks or catches *e, e*, (fig. 10,) which take into the teeth of the ratchet wheels *f, f*; these ratchet wheels are mounted on the axles of the fluted rollers *d*. The catches *e*, are worked up and down by the rods *g, g*, the lower ends of which are connected to a lever *h*, which is worked by the crank *i*, and crank rod *j*. The crank *i*, is on the driving shaft of the engine, and rotary motion is communicated thereto from a winch handle *k*, in connection with the fly-wheel; at the opposite end of the driving shaft a pinion *l*, is mounted, which gears into a corresponding pinion *m*, so that by placing another winch on the axle of the latter, additional power may be employed to drive the machine. The upper fluted roller *d*, turns in bearings formed in the arms *o*, connected to the lever *n*, which is weighted, in order to keep the rollers in contact with the material to be cut, at the same time allowing them to yield to any accidentally increased thickness of feed, and not choke or work hard, as will sometimes be the case with the ordinary chaff engines. The length of the chaff is regulated by altering the position of the connecting joint of the rod *j*, along the lever *h*, (see fig. 11.)

In conclusion, the patentee states, that he is aware the various parts of which this improved chaff engine is composed have been heretofore employed for similar purposes: he does not, therefore, claim any of the said parts separately; but he claims the peculiar arrangement and combination herein described, and shewn in the drawings hereunto annexed.—[*Inrolled in the Rolls Chapel Office, May,* 1844.]

Specification drawn by Messrs. Newton and Son.

To RICHARD BEARD, *of Egremont-place, New-road, in the county of Middlesex, Gent., for improvements in printing calicoes and other fabrics—being a communication.*—[Sealed 17th June, 1839.]

THE first part of these improvements consists in printing two or more colors from the same cylinder; this is effected by arranging the pattern thereon in such a manner that all those parts which are required to be of the same color shall follow one another round the cylinder in a direct line, so that no crossing or mixture of the colors may take place. When engraved cylinders are used for printing, according to this improvement, the color trough is divided, by transverse partitions, into as many compartments as there are rows of color required to form the pattern, and in each compartment is a small color-roller, mounted upon an axis, which extends the whole length of the trough. In Plate XVIII., fig. 1, is an end view of the color trough and its appurtenances; and fig. 2, is a longitudinal section of part of the same. *a,* is the color trough; and *b,* the printing cylinder, which is supplied with different colors by the rollers *c,* fixed on the shaft *d.* Any superfluous color is removed from the cylinder by the "doctor" or scraper *e,* and is conducted into its proper division of the trough by the partitions *f,* (one of which is shewn separately at fig. 3,) inserted between the various compartments, and kept in contact with the cylinder by means of springs *g.* If cylinders with raised printing surfaces are used, a "furnishing-roller" is interposed between each color-roller and the cylinder.

The second part of this invention consists in a mode of supplying color to cylinders, which have their printing surfaces in relief, by means of a peculiar construction of roller, termed a "transmitting-roller." Around the surface of this roller, and extending the whole length thereof, are twelve slides, having a number of raised color surfaces, covered with cloth; on the under-side of each slide a pair of rollers are mounted, which work against excentric guides in the interior of the transmitting-roller; so that, as the transmitting-roller revolves, the slides will be moved a greater or less distance endwise, according to the degree of curvature given to the guides. The color surfaces are supplied with color by a row of carrying or furnishing-rollers, which work in contact with the color-rollers; and any excess of color is removed from the carrying-rollers and color surfaces by means of doctors. The reason for moving the slides endwise is, to cause those surfaces which are to receive the same description of color to follow one another in a direct line, as they approach the carrying-rollers; and, after receiving the color, to be arranged in suitable positions for transmitting it to the required parts of the pattern.

This will be more clearly understood by reference to the diagrams, figs. 4, and 5; fig. 4, representing part of some of the slides in suitable positions for transferring the color on to the printing cylinder; and fig. 5, shewing their relative positions when in readiness for having the color applied to them by the carrying-rollers. The colors to be printed are supposed to be brown, green, pink, and violet, represented by the letters *b*, *g*, *p*, and *v*, which are also marked upon the corresponding carrying-rollers, seen at fig. 6; and it will be perceived that the ends *, of the slides range evenly together, when transferring the color to the printing cylinder; but that, when receiving the color, some of the ends project beyond the rest, in order that the corresponding color surfaces may range in suitable lines, as above mentioned.

The third improvement consists in producing cylinders with printing surfaces in relief, by fixing suitable raised figures or designs upon metal cylinders. A solder, consisting of twenty parts of pewter, eight of lead, four of bismuth, and one of antimony, is preferred to be used for fixing the designs on the cylinder; the surface of which is first prepared by coating it with a mixture of three parts of water, three of muriatic acid, and one of sal-ammoniac. The under surface of the parts forming the design is coated with the solder; they are then placed in their proper positions, and held for a short time, while a hot iron is applied to their upper surface, to make them adhere.

The fourth and last improvement consists in forming cylinders for relief-printing of any suitable cement or composition (which will become sufficiently hard when cold, and will not be liable to injury in the operation of printing), and inserting therein the figures composing the design. The composition, preferred by the patentee, is made by melting one part of asphaltum, with one of hog's lard, and five parts of black pitch, with two of white pitch, and then intimately mixing these ingredients with twenty parts of sand, and five of red ochre. The figures are sunk into the cylinder (which is formed of the above composition) to the depth of about three-eighths of an inch, by means of a hot iron, and pressure; and any irregularity in their surfaces is afterwards reduced by filing.

The claims made by the patentee are, Firstly,—the mode, herein described, of printing two or more colors from the same printing cylinder, by applying different colors around different parts of the same cylinder. Secondly,—in transposing colors on what the patentee has called a transmitting-roller, whereby he is enabled to apply different colors to the same printing cylinder. Thirdly,—the mode of producing printing cylinders for relief-printing, by affixing the relief surfaces to metal cylinders, as above described. Fourthly,—the mode of producing printing cylinders by means of suitable cement or composition, in substitution of wood, as above described.— [*Inrolled in the Inrolment Office, December,* 1839.]

To Joseph Bower, *of Hunslet, near Leeds, in the county of York, soda ash manufacturer, for certain improvements in the manufacture of carbonate of soda.* — [Sealed 4th March, 1840.]

This invention consists in using the bicarbonate or sesquicarbonate of ammonia to decompose sulphate of soda, for the purpose of producing carbonate of soda.

The mode of operating is as follows:—Into an iron cylinder, containing an agitator, 200 parts of water, 86 of bicarbonate of ammonia, and 100 of anhydrous sulphate of soda, are put, and agitated for a period varying from eighteen to thirty-six hours. From the reaction which takes place, bicarbonate of soda and sulphate of ammonia are produced; the bicarbonate of soda is then drained and filtered; and, in order to separate therefrom all the solution of sulphate of ammonia, the mass is also submitted to pressure. The bicarbonate of soda may now be converted into the ordinary carbonate of soda, by subjecting it to a low red heat in a retort, or close furnace, in connection with a cool receiver, by which means any ammonia that may remain will be collected.

When the sesquicarbonate of ammonia is used, a current of carbonic acid gas is introduced into the cylinder, while the mixture is being agitated, to convert the free ammonia present into bicarbonate of ammonia.

The patentee claims the use of the bicarbonate of ammonia, or the sesquicarbonate of ammonia, in producing carbonate of soda from the decomposition of sulphate of soda.—[*Inrolled in the Petty Bag Office, September,* 1840.]

To William Bush, *of Union-street, Deptford, in the county of Kent, engineer, for improvements in rendering magnetic needles less prejudicially influenced by local attraction.*— [Sealed 9th November, 1843.]

These improvements consist in mounting marine compasses in such a manner, that local attraction, arising from large masses of iron being in the vicinity of the compass, will be centralized in or near the axis of motion of the magnetic needle.

In Plate XVIII., fig. 1, is a vertical section of the improved compass. *a,* is the brass standard frame or compass box, supporting the universal joint, from which the magnetic bars *c, d, e,* are suspended; these bars act as a pendulum, and receive the magnetism of all iron near the instrument; *b,* is the compass bowl or basin in which the magnet and card revolve; *c,* the centre magnetic steel or iron bar, supporting the needle on which the magnet and card revolve; and *d,* highly magnetized bars, in contact with the bar *c*; these bars *c, d,* are placed with the north pole upwards; but this may be reversed; and, in some cases, only a single bar is necessary; *e,* is an outer circle of highly magnetized steel or iron bars, with their south poles upwards, or the entire combination may be alternated; and *f,* is a casing of brass or other metal, to protect the magnetic bars from corrosion. The axis on which the magnetic needle moves is caused to float on mercury or other fluid, instead of being fixed, as usual; and, for this purpose, a cistern of mercury, *g,* is fixed in the compass bowl; the cistern being made (by preference) of metal, lined with glass. The axis of the compass is fixed in a float of cork or other material *h,* and passes upwards through a stuffing-box in the top of the cistern, to support the cone *i*; this cone has an agate at its internal apex, to receive the upper end of the axis, and one on its external apex, to receive the lower end of the point of the needle; but if the cone is not employed, an agate is fixed on the needle, as usual, to receive the point of the axis.

Where the barometer is required, the compass is slightly modified, as represented in the section, fig. 2. *j,* is a magnetized steel or iron cistern, containing mercury, and connected with the magnetic tube *k*; this tube is substituted for the bar *c,* (in fig. 1,) and through it the mercury will ascend, serving also as a balance for the bowl or basin.

Fig. 3, represents a compound magnet, with four north and four south points; the current of magnetic attraction will proceed in a direct line between the four north points, the two nearest points forming an angle therewith of 22½° east and west. Fig. 4, is a compound magnet, with three north and three south points; in this case, the current of magnetic attraction proceeds directly through the three north points, and by the centre point due north will be determined. Fig. 5, is a magnet, constructed on the same principle as the one shewn at fig. 3, but with only four points; the current of magnetic attraction passes through the centre of the magnet, the angle formed being 45° instead of 22½°. Fig. 6, is a magnet with three points; in this instance the single point, marked N, determines the due north, the two other points forming an angle therewith of about 120° east and west. Fig. 7, is a magnet also with three points; the north point being in the direct magnetic line, and the south-easterly and south-westerly points, describing an angle of 90° with each other, through the centre of which the north and south point passes. Fig. 8, exhibits the straight bar magnet (the section of which is shewn in fig. 1,) with the points directed north and south.

In all the figures, the north and south poles and points are indicated by the letters N, and S.

The patentee claims the mode, above described, of rendering magnetic needles less prejudicially acted on by local attraction, by causing the attraction arising from local causes to be centralized in or near the axis of motion of magnetic needles; also, the mode of constructing magnetic needles with three or more points; and likewise, the floating of an axis for a magnetic needle, by means of fluid.—[*Inrolled in the Inrolment Office, May,* 1844.]

To WILLIAM EDWARD NEWTON, *of the Office for Patents,* 66, *Chancery Lane, in the county of Middlesex, civil engineer, for an invention of improvements in furnaces or fire-places,—being a communication.*—[Sealed 4th November, 1843.]

THIS invention of improvements in furnaces or fire-places, communicated to the patentee from abroad, consists of a novel construction or form of fire-bars, intended to constitute the grate of a furnace, whereby a considerable economy is effected, and other advantages are obtained. The peculiar form of fire-bars, intended to be claimed under this patent, is shewn in Plate XVIII., in which fig. 1, represents an end elevation of one of the improved fire-bars; and fig. 2, an end or front elevation of several of these bars, arranged or combined in the manner they would be placed to constitute a grate; fig. 3, is a sectional representation of the same, taken transversely across the bars; and fig. 4, represents the under-side of two or a pair of the bars.

It will be seen, upon referring to figs. 2, and 3, that the upper surfaces of the bars are inclined at an angle to the horizon, and are arranged in pairs; the surface of each single bar being placed at an opposite angle to its fellow, or adjoining one.

By these means, the surface of the grate or bed of the furnace is indented, so that a portion of the fuel lies between the bars, in angular recesses, and the remaining part of the fuel above them. It will also be seen, on inspecting the sectional view, fig. 3, that the inclined bars are furnished with feet *a*, *a*, *a*, or deep bars below, for the purpose of affording strength, and supporting them in the places on the cross bar *b*, *b*, fig. 2; and that the lateral edges of the bars are set at a little distance apart, so as to form long narrow slits or openings *c*, *c*, and *d*, *d*, between them, for the admission of air from the ash-pit, through the grate, in order to support the combustion of the fuel. By means of this construction and arrangement of bars, air is admitted to the interior of the fire at two different altitudes, and the fuel is more regularly and economically consumed than in grates of the ordinary construction.

When the fire-bars are arranged in the proper manner on the cross bars *b*, *b*, they are retained in their proper positions by means of the end plates *e*, *e*, *e*, fig. 2, (one of which is shewn detached at fig. 5,) which also rest on the cross bars *b*, *b*.

The patentee states, that he is aware that grates have been already constructed in which the fuel rests on the angular sides of the bars: he does not, therefore, intend to claim this, as constituting any part of the present invention, excepting when the same is combined with the other parts of the improvements; but he claims constructing the grates of furnaces or fire-places in such a manner, that the air to support combustion may be supplied between the fire-bars at different planes, altitudes, or elevations, as above described.—[*Inrolled in the Petty Bag Office, May,* 1844.]

Specification drawn by Messrs. Newton and Son.

To JAMES GARDNER, *of Banbury, ironmonger, for improvements in cutting hay, straw, and other vegetable matters, for the food of animals.*—[Sealed 27th October, 1842.]

THIS invention consists in dividing the mouth-piece of a chaff-engine or machine into two parts, in order that the "cut" may be made near the axis of motion of the knives: another advantage will be also gained, viz., a cut will be made at opposite sides of the axis, at every revolution of the knives.

In Plate XVIII., figs. 1, 2, 3, and 4, shew the various parts of the machine: fig. 1, is a plan view; fig. 2, a longitudinal section, taken in the line A, B, fig. 1; fig. 3, a front view, with the fly-wheel and part of the framing removed; and fig. 4, the feed-rollers and mouth-piece detached, and seen on the opposite side to fig. 3. *a, a,* is the framework of the chaff-cutting engine; *b,* the trough, divided by a partition into two channels, along which the material to be cut is conveyed; *c, c,* two pairs of feed-rollers, turning upon axles, which extend across the machine. Upon each of these axles, and between the rollers *c, c,* a worm-wheel *d,* is mounted (see fig. 4); these wheels are made to revolve by a worm *e,* attached to the shaft *f,* on which the arms *g,* for holding the knives or cutters, and the fly-wheel *h,* are mounted; *i,* is a bearing for the shaft *f*; *j,* is the mouth-piece, having two openings in it for the passage, to the knives, of the hay or other material to be cut: the length of cut is determined by the angle of the worm *e*, which may be changed as required. The upper feed-rollers *c*, are protected from dirt, &c., by a cover, which is removed in the plan view, fig. 1. From this description it will be seen, that each knife, during one revolution, will make two cuts,—one from the materials fed through the right-hand, and one from the left-hand mouth-piece.

The patentee remarks, that although he has described a machine embracing both his improvements, viz., having a divided mouth-piece, and applying the axis of the knives in such a manner, that each knife may make a cut at opposite sides of its axis; yet he does not confine himself thereto, as the parts may be varied; such, for instance, as employing two sets of knives, mounted on axles, set one on each side of the machine, whereby the advantages derived from using two mouth-pieces, and cutting near the axis of motion, will be retained.

A drawing of a chaff-engine, constructed with two sets of knives, is attached to the specification; but the above described machine being preferred by the patentee, and the arrangements of the two being very similar, it will not be necessary further to describe this modification.

The patentee claims, Firstly,—the mode of constructing a chaff-cutting machine, by having a double or divided mouth-piece, as above described; and, Secondly,—the mode of constructing a chaff-cutting machine, by applying the knife axis in such a manner, that each knife thereon shall make a cut at opposite sides of its axis of motion, in each revolution, as above described.—[*Inrolled in the Inrolment Office, April,* 1843.]

To John Barnes, *of Church, in the county of Lancaster, chemist, and* John Mercer, *of Oakenshaw, in the county of Lancaster, calico printer, for certain improvements in the manufacture of articles used in printing and dyeing cotton, silk, woollen, and other fabrics.*—[Sealed 10th November, 1842.]

This invention consists in the manufacture of a new material, termed by the patentees "assistant mordant liquor," which, when combined in certain proportions with the ordinary mordants, renders them more effective and useful, thereby improving the manufacture of such articles. The manner in which the improvements are carried into effect is as follows:—To 100 lbs. avoirdupois of potato starch, add 37½ gallons of water, 12½ gallons of nitric acid of commerce (specific gravity 1·300), and four ounces avoirdupois of oxide of manganese. The chemical action which takes place among these ingredients is allowed to proceed until the nitric acid is destroyed. To the residuum thus produced, add fifty gallons of pyrolignic acid, and the compound is the assistant mordant liquor, in a fit state to add to the various mordants used in printing and dyeing. The proportion in which the assistant mordant liquor must be added, to produce the various improved mordants, will vary according to the chemical properties and nature of the mordant to which it is applied; but, by experience, the following proportions have been found to produce a greatly improved article:—For black, take one gallon of iron liquor (pyrolignate of iron, well known in the arts), one gallon of assistant mordant liquor, and one gallon of water, either thickened or not, according to the mode in which it is to be applied. For purple, take one gallon of iron liquor, two gallons of assistant mordant liquor, and six gallons of water. For paler purple, one gallon of iron liquor, three gallons of assistant mordant liquor, and twelve gallons of water; and for still paler purple, one gallon of iron liquor, four gallons of assistant mordant liquor, and from twenty to thirty gallons of water. These improved articles or mordants, are applied, washed, and dyed in the usual way. For tin or aluminous mordants, the same rule is followed; excepting that red liquor, or other salts of alum, or muriate of tin, or other salts of tin, are used, instead of iron liquor, or other salts of iron. For dyeing silk or woollen, the assistant mordant liquor is added to the tin, iron, or aluminous mordant, either with or without coloring matter, in the same boiler; but this, and other practical arrangements, must depend on the judgment and skill of the operator. Having described one process by which assistant mordant liquor is produced, and the manner in which it may be compounded with ordinary mordants, for the purpose of improving the manufacture of such articles, the patentees state, that they do not confine themselves to the use of nitric acid in the manufacture of assistant mordant liquor, as the same result may be obtained by the use of other oxidizing agents; such, for instance, as the acid and salts of chromic acid, or the oxides of manganese, along with a mineral acid. Nor do they limit themselves to any exact proportions of acid, or other ingredients; their intention being to carry on the decomposition as far as possible without forming oxalic acid, and as little as possible of carbonic acid, in the process, which is greatly aided by the catalitic action of the manganese, preventing the formation of oxalic acid; and, although potato starch has been found to answer well in the process already explained, yet other starchy, saccharine, or gummy substances may be employed—indeed, all substances which contain little nitrogen, and where the oxygen and hydrogen are in the proportion to form water, or nearly so.

The patentees, therefore, claim the improved manufacture of articles used in printing and dyeing, called mordants, made by the admixture of their "assistant mordant liquor;" as also the manufacture of the assistant mordant liquor, which is produced in the manner already described, by the partial decomposition of all kinds of starch, flour of wheat, oats, barley, rye, maize, Indian corn, rice, sago, arrow-root, linseed, hempseed, potatoes, and all other farinaceous substances; as also of gums, whether natural or artificial; such as British gums, dextrine, and all kinds of saccharine substances from the sugar cane, beetroot, grapes, Indian corn, straw, maple, molasses, or any other saccharine substances; also ligneous fibre, or any kind of ground wood, or other vegetable, which, when acted on by any of the oxidizing substances already named, produces a residuum, which, mixed with pyrolignic acid, form an "assistant mordant liquor."—[*Inrolled in the Inrolment Office, May,* 1843.]

To Richard Beard, *of Egremont-place, New-road, in the county of Middlesex, Gent., for improvements in printing calicoes and other fabrics,—being a communication.*— [Sealed 13th October, 1843.]

This invention relates to the "transmitting or sieve rollers" used for supplying color to printing cylinders which have their printing surfaces in relief. The improvement consists in giving the requisite elasticity to those rollers by the use of glutinous or gelatinous matter, which will yield to pressure, and return to its original form when the pressure is removed.

The composition preferred by the patentee is made of glue and treacle, in the proportion of from two to three pounds of glue (which has been steeped for about six hours) to four pounds of treacle; this mixture is boiled for four or five hours, and kept constantly stirred. The apparatus used for making this composition into rollers, is represented in Plate XVIII., fig. 7, being a vertical section, and fig. 8, a plan thereof. *a*, is a cylinder, formed by bending a plate of zinc, or other suitable material, and it is retained in that shape by hoops *b*, provided with screws and nuts; *c*, is an axis for the roller, with suitably turned necks, at its ends; and *d*, *d*, are circular plates fixed on the axis *c*, to form the ends of the roller; the upper plate having two holes in it, through one of which the composition is poured (the mould having been previously oiled), and through the other the air escapes. After the composition roller is removed from the mould, it is covered with "oil case," and over this is placed elastic cloth or felt, which has been previously coated with India rubber on the side which comes in contact with the oil case; the object being to prevent the liquid color from penetrating to the composition. The roller is now ready for use.

When several colors are to be printed by the same cylinder, as described in the specification of a patent granted to the present patentee in 1839,* the surface of the composition roller is divided into the requisite number of transmitting surfaces by circular plates. Fig. 9, is a transverse section, and fig. 10, a front view, of part of a color trough, with the rollers and cylinders to be used in printing calicoes, &c. *e*, is the trough, divided into a number of color spaces by partitions *f*; in each space a color roller *g*, is mounted, and by these the colors are supplied to the sieve-roller *h*, by which they are transmitted to the printing cylinder *i*; *j*, is the bowl or bed roller, round which the cloth passes to be printed; and *k*, is a common printing cylinder, for printing the ground of the pattern. Each transmitting surface on the roller *h*, is separated from the rest by its pair of plates *d*, and the colors are effectually prevented from becoming mixed by the partitions *f*, entering the spaces between the transmitting surfaces; any superfluous color is removed by the doctor *l*, part of which is shewn separately at fig. 11.

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* For description of this invention, see p. 409 of our present volume.

The patentee claims the application of sieve rollers, such as are herein described, in combination with printing cylinders, or rollers, for printing calicoes, and other fabrics.—[*Inrolled in the Inrolment Office, April,* 1844.]

To THOMAS DRAYTON, *of Brighton, in the county of Sussex, Gent., for improvements in coating glass with silver, for looking-glasses and other uses.*—[Sealed 25th November, 1843.]

A MODE of silvering glass, for looking-glasses and other uses, without the employment of quicksilver, constitutes the subject of this patent; it consists in depositing silver, from a solution, upon glass, by de-oxidizing the oxide of silver in solution, in such a manner that the precipitate will adhere to the glass, without the latter having been coated with metallic or other substances.

A mixture is first made of one ounce of coarsely pulverised nitrate of silver, half an ounce of spirits of hartshorn, and two ounces of water; which, after standing for twenty-four hours, is filtered, (the deposit upon the filter, which is silver, being preserved) and an addition is made thereto of three ounces of spirit, (by preference, spirit of wine,) at 60° above proof, or naphtha; from twenty to thirty drops of oil of cassia are then added; and, after remaining for about six hours longer, the solution is ready for use. The glass to be silvered with this solution must have a clean and polished surface; it is to be placed in a horizontal position, and a wall of putty or other suitable material formed around it; so that the solution may cover the surface of the glass to the depth of from an eighth to a quarter of an inch. After the solution has been poured on the glass, from six to twelve drops of a mixture of oil of cloves and spirit of wine (in the proportion of one part, by measure, of oil of cloves to three of spirit of wine) are dropped into it, at different places; or the diluted oil of cloves may be mixed with the solution before it is poured upon the glass: the more oil of cloves used, the more rapid will be the deposition of the silver; but the patentee prefers that it should occupy about two hours. When the required deposit has been obtained, the solution is poured off; and as soon as the silver on the glass is perfectly dry, it is varnished with a composition formed by melting together equal quantities of bees' wax and tallow. The solution, after being poured off, is allowed to stand for three or four days, in a close vessel; as it still contains silver, and may be again employed after filtration, and the addition of a sufficient quantity of fresh ingredients to supply the place of those which have been used: the patentee states, that, by experiment, he has ascertained that about eighteen grains of nitrate of silver, are used for each square foot of glass; but the quantity of spirit varies somewhat, as its evaporation depends upon the temperature of the atmosphere, and the duration of the process.

If the glass be placed in an inclined, or even a vertical position, and the surface covered over, leaving a narrow space for the solution between the surface of the glass and the cover, which fits close, then, by using spirit without water in the mixture, the object will be accomplished. By the addition of a small quantity of oil of carraway or thyme, the color of the silver may be varied. The oil of cassia, purchased of different manufacturers, varies in quality; therefore, if, on being mixed with the solution, it should become flaky, the solution must be filtered, previous to use.

The patentee, in concluding his specification, says, that he does not confine himself to the precise details herein described, provided the peculiar character of the invention be retained, whereby silver is deposited on to glass from a solution of that metal, by deoxidation, in such a manner as to cause the silver to adhere. to glass, without any previous coating of the latter.—[*Inrolled in the Inrolment Office, May*, 1844.]

To Frederick Steiner, *of Hyndburn Cottage, near Accrington, in the county of Lancaster, Turkey-red dyer, for an invention of a new manufacture of certain coloring matter, commonly called Garancine,—being a communication.*—[Sealed 8th August, 1843.]

This invention consists in manufacturing a certain coloring matter, called Garancine, from refuse madder, or madder which has been previously used in dyeing; such madder having, prior to this invention, ordinarily been thrown away, as spent, and of no value, and the said coloring matter, called Garancine, having been produced heretofore from fresh or unused madder. The manner of carrying the invention into effect is as follows:—Outside the building in which the dye-vessels are situate, a large filter is formed, by sinking a hole in the ground, and lining it at the bottom and sides with bricks, without any mortar to unite them. Upon the bricks a quantity of stones or gravel is placed, and over the stones or gravel common wrappering, such as is used for sacks; below the bricks is a drain, to take off the water which passes through the filter. In a tub adjoining the filter, a quantity of dilute sulphuric acid, of about the specific gravity of 1·050, (water being 1·000,) is kept. Hydrochloric acid will answer the several purposes for which sulphuric acid is used; but the patentee prefers sulphuric acid, as more economical. A channel is made from the dye-vessels to the filter. The madder which has been employed in dyeing, and which is in the state considered as spent or refuse madder, is run from the dye-vessels to the filter; and while it is so running, a portion of the dilute sulphuric acid, sufficient to change the colour of the solution, and the undissolved madder, to an orange tint or hue, is run in, and mixed with it. This acid precipitates the coloring matter which is held in solution, and prevents the undissolved madder from fermenting, or otherwise decomposing. When the water has drained from the madder, through the filter, the residuum is taken from off the filter, and put into bags. The bags are then placed in a hydraulic press, to have as much water as possible expressed from their contents. In order to break the lumps which have been formed by compression, the madder, or residuum, is passed through a sieve. To five hundred-weight of madder, in this state, placed in a wooden or leaden cistern, one hundred-weight of sulphuric acid of commerce is added, by sprinkling it on the madder through a leaden vessel, similar in form to the ordinary watering can used by gardeners. The madder is then worked about, so as to mix it intimately with the acid. In this stage the madder is placed upon a perforated leaden plate, which is fixed about five or six inches above the bottom of a vessel. Between this plate and the bottom of the vessel a current of steam is introduced, by a pipe, so that it passes through the perforated plate, and the madder which is upon it. During this process, which occupies from one to two hours, a substance is produced, of a dark-brown color, approaching to a black. This substance is Garancine, and insoluble carbonized matter. It is next thrown on the floor to cool; and, when cool, is placed upon a filter, and washed with clear cold water, until the water passes from it without an acid taste. The substance is then put into bags, and subjected to hydraulic pressure; it is next dried in a stove, and ground to a fine powder under ordinary madder stones, and afterwards passed through a sieve. In order to neutralize any acid that may remain, for every hundred-weight of this substance, from four to five pounds of carbonate of soda, in a dry state, are added, and intimately mixed therewith: the Garancine in this state is ready for use.

The patentee claims the manufacture, above described, of the coloring matter called Garancine, from madder which has been previously used in dyeing, and which is usually called spent madder.—[*Inrolled in the Inrolment Office, February,* 1844.]

To Joseph Cooke Grant, *of Stamford, in the county of Lincoln, ironmonger and agricultural-implement maker, for improvements in the construction of harrows.*—[Sealed 6th July, 1843.]

This invention consists in combining apparatus with harrows for the purpose of occasionally cleansing or scraping the tines thereof.

In Plate XVII., fig. 1, is a plan, exhibiting the mode of applying a scraping apparatus to a couple of harrows; and fig. 2, is a side view, with one of the hind wheels taken away. Each harrow, *a*, rests upon its scraping-frame *b*, (the tines passing through holes or openings in the frame *b*,) suspended by chains *c*, from the quadrangular frame *d*; and the frame *d*, is mounted upon a pair of hind-wheels *e*, and a fore-wheel *f*, which is capable of locking or moving round with the spindle *g*.

When their tines require to be scraped, the harrows are raised, so as to cause the tines to pass through the openings or holes of the scraping-frames; which, being only just large enough for that purpose, their edges will remove the accumulated soil or other matters from the tines. Various means may be adopted for raising the harrows; but the following apparatus is employed by the patentee:—Beneath each scraping-frame are two horizontal shafts *h*, *i*; to the shaft *h*, two arms, *j*, are affixed, and these are connected to two other arms, *k*, upon the shaft *i*, by pin joints *l*, the holes of which are long enough to allow of a little play in passing the centres; the outer ends of the arms *j*, and *k*, have slots in them, to receive rollers carried by the bars *m*, of the harrows. On the shaft *h*, two curved arms *n*, combined together by bars *o*, are also affixed; from the outer ends of these arms is suspended a swinging-frame *p*, furnished with a handle *q*; and there are studs or projections *r*, upon the frames *p*, which pass through slots in the arms *n*, as is shewn. The lower end of the frame *p*, is suitably formed for stepping on the hind bar of the frame *d*, when the harrow is at work; but when it is required to be raised, the frame *p*, is drawn back, and depressed, so as to bring the different parts into the positions represented by dotted lines in fig. 2; and the harrow may be kept raised, while it is being removed from one place to another, by bringing the hooks *s*, of the swinging-frames, under the bar *t*.

The patentee claims combining apparatus with harrows, for scraping or cleansing the tines or teeth thereof, as above described.—[*Inrolled in the Inrolment Office, January*, 1844.]

To ARTHUR WALL, *of Bisterne-place, Poplar, in the county of Middlesex, surgeon, for certain improvements in the manufacture of iron.*—[Sealed 18th November, 1843.]

THE first part of this invention consists in adding to the iron, while in a state of fusion in the smelting, puddling, balling, or reheating furnaces, certain compound masses, which the patentee has designated, for more clearly explaining his process, A, and B.

The composition A, is a mixture of steel or wrought iron, in a comminuted state, such as filings or fine cuttings, with melted rosin, in the proportion of two pounds of filings to five pounds of rosin; it is made into balls of five pounds each, and thrown upon the melted iron, in the ratio of one ball to five hundred-weight of metal. If preferred, instead of the rosin, other resinous substances, and the varieties of turpentine, asphaltum, tar, and pitch, may be substituted; and a few pounds of charcoal may be added to the composition. The composition B, is a mixture of common salt, rosin, and charcoal or other carbonaceous matter, which is made into balls, and thrown upon the fused iron, after it has been acted upon by the balls A, in the proportion of one pound of the composition B, to each hundred-weight of metal. Certain other fluxes, such as borax, nitre, or fixed alkalis, may be substituted for the salt.

The second part of this invention consists in subjecting the iron, while in a fluid state, and while in the act of solidifying, to a current of electricity, which is caused to traverse the whole mass.

In casting a bar or similar mass, the electric current is caused to traverse from end to end, by conductors so arranged, that when the metal runs into the mould it may complete the electric circuit, or by means of a wire or wires, passed from one end of the mould to the other. If the castings are horizontal, a piece of wrought iron or other conducting material is placed at each end of the mould, which is made of sand or other non-conducting substance: these conductors are then connected by wires with a galvanic apparatus, or voltaic pile, or electro-magnetic or other battery; so that, when the melted iron is run into the mould, it will complete the electric circuit; and the patentee prefers to continue the electric current for some time after the iron has solidified. When the castings are vertical, a similar arrangement is made for the passage of the electric current through the metal, by placing a conductor at the top and bottom of the mould, in such a manner, that the electric circuit will be completed the moment the mould is filled with the liquid iron.

To apply electricity to iron in a smelting furnace or cupola, a wrought-iron rod is introduced through or at the side of the tap-hole, until it comes in contact with the melting metal, and another wrought-iron rod is introduced at the upper and posterior part of the hearth, or through one of the tuyère holes, until it reaches the metal; the outer ends of these rods being then connected with a battery, the electric current will be caused to pass through the iron; care being taken not to continue it so long as to entirely decarburate the iron, and bring it to a malleable state. When the electricity is to be applied to the iron in a puddling or balling furnace, two iron rods are also used; one of which is inserted into the fused metal, and the other end is connected with a battery; the other rod is attached to an insulating handle of porcelain, pottery, or other non-conducting substance, and a wire from the battery is connected to it, close to the handle. By means of the handle, the extremity of the rod is caused to traverse the iron in its melted state, or during its transition to the solid state, and the electric current will therefore pass through the metal in every possible direction.—[*Inrolled in the Inrolment Office, May,* 1844.]

To Benjamin Cook, *jun., of Birmingham, in the county of Warwick, merchant, for his invention of certain improvements in coating or covering the surfaces of metals of various forms, and of applying the same to a variety of useful purposes.*—[Sealed 18th December, 1843.]

This invention consists in applying the elements or principles of the invention for which a patent was granted to the present patentee, on the 23rd of May, 1842, to other purposes than those therein contemplated. The former invention was described as consisting in constructing the post-shafts or pillars, and other parts of bedsteads, of metallic tubes, and covering the same with paper, papier-mâché, pasteboard, or other similar material, and afterwards japanning or otherwise ornamenting the same. Now, the object of the present invention is, to apply this principle or mode of covering metals with paper or papier-mâché, and afterwards japanning them, to a wider range of articles.

The present invention consists in permanently coating or covering the surfaces of metallic articles, of various shapes and forms, with paper, papier-mâché, pasteboard, or some other similar material, so as to form an external surface for japanning, painting, or otherwise decorating the said articles. A thin sheet of metal is first fastened, in any convenient manner, into the shape or form, or nearly so, of the article intended to be produced, and then covered over with a number of layers of paper, or paper-pulp, in the manner usually adopted in making papier-mâché articles. The thickness of the paper coating must depend in some measure upon the character and size of the article to be coated; but it must always be sufficiently thick to afford a firm hold to the japanning or painting materials to be put upon it. The operations of japanning, painting, and decorating, are to be conducted in precisely the same manner as when the articles are made entirely of papier-mâché, or of plate-metal, as common tea-boards, trays, dishes, &c., and therefore need not be more particularly described.

The articles to which the improvements particularly apply, are such as the following:—viz., cornice poles, rings and ends, curtain pins and bands, finger-plates, window and other cornices, trays and waiters, chimney-pieces, bread and other baskets, tea-urns, plates, dishes, and tureens, dish covers, fenders, balustrades, bars, and bannister rails, portfolios, and other similar articles, which are ordinarily made of papier-mâché or metal.

The patentee desires it to be understood, that he lays no claim, under this patent, to the application of his invention to bedsteads, or any part thereof, that having been fully claimed in the specification of a former patent.* But he claims permanently coating or covering the surfaces of the above-mentioned articles (bedsteads excepted) with paper, papier-mâché, or other similar materials, which are capable of forming a basis or ground for japanning, painting, or decorating; and which articles, when so constructed, coated, and covered, are made to resemble articles made of papier-mâché only, but possess much greater strength and solidity.—[*Inrolled in the Petty Bag Office, June,* 1844.]

Specification drawn by Messrs. Newton and Son.

To JAMES NAPIER, *of Hoxton, in the county of Middlesex, dyer, for improvements in preparing or treating fabrics made of fibrous materials, for covering roofs, and the bottoms of ships and vessels, and other surfaces, and for other uses.*—[Sealed 11th April, 1843.]

THIS invention consists in coating or incorporating with metal, by electro-deposition, fabrics made of fibrous materials, such as linen, canvass, woollen, silk, calico, cord, thread, rope, paper, pasteboard, felt, &c. The patentee does not confine himself to any particular mode of conducting the process; but he describes some methods which he has employed; dividing his description into two parts, viz., the preparation of the fabric, to give it a conducting surface; and the deposition of metal thereon by electricity.

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* For a description of this invention, see Vol. XXII. p. 216.

In the preparation of the fabric, the patentee employs any of the well-known methods of reducing the metal on the surface, but he prefers to use the following methods, which he claims as his invention:—Plumbago or black lead is made to adhere to and enter into the interstices of the fabric, by grinding it very fine, agitating it with water, and immersing the fabric therein; and, in some cases, the fabric may be boiled in it. A compound of iron and zinc is produced by subjecting a mixture of pieces of iron and zinc, for some hours, to a temperature just below that at which it distils, in an iron vessel, closely luted, with a pipe proceeding therefrom, as is usual in distilling zinc; a crystalline compound is thus produced, which is ground into fine powder, and mixed with the black lead; and, as this compound readily reduces many metallic salts, in consequence of its affinity to oxygen, it is very useful in obtaining a metallic surface. Another method of obtaining a metallic surface on one side of the fabric, consists in attaching plates or other pieces of metal closely to the other side. To produce a conducting surface of copper, the fabric is impregnated with a salt of that metal, which is then reduced by the aid of the liquid termed *glycerine:* any of the substances known as reducing agents may be employed for the reduction of the metal in the fabric; and it may also be reduced by connecting the fabric with a galvanic arrangement, so that the hydrogen generated may pass through it. Another mode of reducing metal, particularly applicable to gold and silver, consists in exposing the fabric, which has been impregnated with a metallic salt, to the action of a current of phosphoretted hydrogen and other gases: the fabric is placed in an air-tight chamber, from which, by the admission of hydrogen or ordinary coal-gas, the air is ejected, and passes off through a bent pipe, which terminates under the surface of the water in a pneumatic cistern; the reduction of the metal is then completed, by passing phosphoretted hydrogen through the chamber. This gas is generated from phosphorus and a solution of caustic potash, the surface thereof being covered with a portion of æther, which, becoming volatized on the application of heat, expels the air from the retort, and thereby prevents the combustion of the phosphoretted hydrogen. To produce a more perfect union of the fabric and the metal, the patentee sometimes introduces or weaves thin wires into the fabric, at intervals. Phosphorus dissolved in sulphuret of carbon (which may be diluted with turpentine) is also used for reducing metallic salts, with which the fabrics are to be impregnated, after having been dipped in the solution of phosphorus.

With regard to the deposition of metal on fabrics, one method consists in covering a sheet of iron, on one side, with a porous diaphragm (using any of the materials ordinarily employed in sustaining galvanic batteries; but, by preference, a mixture of equal quantities of plaster of Paris and Roman cement), and fixing the fabric on the other side, by means of wax, or any other substance not soluble in the metallic solution. Two or more sheets, thus arranged, are placed in a vessel, containing the solution of metal to be deposited, and are connected together by wires, which proceed from each sheet of iron to the cloth on the next sheet, so as to form a galvanic series. The fabric may, if preferred, be made to surround a plate, or other suitably shaped piece of metal, and be attached thereto by paste, or other suitable material; which paste may be mixed with black lead, or the compound of zinc and iron, or the finely precipitated metal obtained by the aid of *glycerine*. Another method consists in pasting the fabric upon a plate of amalgamated zinc or other metal, and rubbing the compound of zinc and iron upon its surface; it is then placed in a suitable metallic solution, and attached to the zinc plate of a galvanic battery, whilst another plate or piece of the metal to be deposited is connected to the copper plate of the battery.

The patentee claims the method of preparing or treating the fabrics, herein described, by impregnating and covering them with metal or metals, by electro-deposition, so as to obtain a material, which, on account of its lightness and other valuable properties, is peculiarly suitable for covering roofs, and the bottoms of ships and vessels, and other surfaces, and for many other useful purposes.—[*Inrolled in the Inrolment Office, October*, 1843.]

To William Fletcher, *of Moreton House, in the county of Buckingham, clerk, for certain improvements for the purpose of securing corks, or substitutes for corks, in the mouths of bottles, or vessels of the nature of bottles, whether made of pottery, or of pottery of the kind called stone-ware, or of glass.*—[Sealed 24th August, 1843.]

This improved method of securing corks in bottles, consists in making a hole through the mouth or neck of the bottle, or vessel of the nature of a bottle, in such a manner, that, when the cork is placed in the neck of the bottle, a pin may be passed through the neck and the cork or stopper, which will be prevented from being forced out of the mouth of the bottle, by the pressure of any aerated or fermented liquor contained therein.

The claim made by the patentee is, the mode of manufacturing bottles, or vessels of the nature of bottles, with holes in the mouths or necks, to facilitate the securing of corks or stoppers therein.—[*Inrolled in the Inrolment Office, February*, 1844.]

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from p. 372.)

Mr. Galloway said, that the surface of the propeller of the 'Liverpool Screw,' might probably have been too small at first, and therefore each increase would naturally improve its effective power. The area of the propeller should be in proportion to the body to be moved; this law was common to screw-propellers and to paddle-wheels.

The President expressed the gratification he felt at the useful discussion which had been raised on so interesting and novel a subject as the screw propeller, which had become one of such importance in steam navigation, that the Government had directed the serious attention of their officers to it; and he trusted that the examination of this question, like that of the action of Cornish engines, at the meetings of the Institution, would materially tend to its elucidation. As soon as any new and really useful invention was matured, and brought sufficiently into use to enable its merits to be calmly discussed, it was one of the main objects of the meetings to examine it, and he hoped that in a short time a detailed account of the atmospheric railway would be submitted by Mr. Samuda, for the consideration of the Institution.

Mr. Perkins stated, that on a recent examination of the 'Napoléon' at Marseilles, the cast iron of which the propeller was composed, was found to have undergone considerable change, and to have become so soft, that it could be cut with a knife.

Mr. Grantham believed, that circumstance was owing to the cast-iron propeller working too near the copper sheathing of the vessel. Iron vesels would not be liable to that objection. The amount of oxidation was apparently increased, by the cast iron remaining in a state of rest; now, as screw propellers were usually in rapid rotation, and were also generally so constructed that they could be unshipped, they could be painted and preserved from any injurious amount of external corrosion, although a chemical change might still be induced, when the cast iron was in contact with copper.

General Pasley had observed, in the metal raised from the wreck of the 'Edgar' and the 'Royal George,'* that the cast iron was generally soft, and in many instances resembled plumbago; that when small pieces were cut from any of the iron guns, or that these pieces were pounded in a mortar, heat was evolved, but after two or three days the metal cooled again: some of the shot which had been found, had burst into several pieces, under this heating action.†

The wrought iron was not so much injured, except when it was in contact with copper, or gun-metal; some of it appeared to have undergone an unequal action, and presented a reticulated surface, as if the softer portions had been destroyed, leaving the harder fibres uninjured.‡ Those portions of the wrought iron, which were used by the smiths in the dockyards, were declared to be of a better quality than any modern iron. Neither the copper, nor the gun-metal, were much acted upon, unless they were in contact with iron.

Mr. Cottam had observed, with great attention, the iron guns which were brought from the 'Royal George' to the Tower; when they arrived, they were soft, and could be easily cut with a knife; but when he examined them some time afterwards, the metal had resumed its original hardness. This was frequently the case with pump-trees, which had become soft, from immersion in mineral water, but on being taken out and laid aside for a time, they became hard again.

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* The 'Edgar' was sunk in 1711, and the 'Royal George' in 1782.

† A similar action was observed, in the cast-iron shot raised from the 'Mary Rose,' which was wrecked in the reign of Henry VIII.

‡ This appearance was also noticed by Mr. Mallet, and is mentioned in his paper, "On the Corrosion of Iron," &c.—Vide Minutes of Proceedings, 1843, p. 517.

Mr. Galloway stated, that this spontaneous development of heat by cast iron, which had been long immersed in salt water, had been frequently observed. A striking instance of this kind occurred at Woolwich, when an attempt was made to preserve the copper sheathing of vessels from corrosion.

Sir Humphrey Davy suggested to the Admiralty, that the decomposition of the copper sheathing could be neutralized, by the application of tin, zinc, or any other easily oxidable metal; the plan was tried on several vessels, by attaching to them zinc plates, and the protection was so perfect, that the ships' bottoms became covered with barnacles and weeds. Cast iron was then substituted, on the supposition that the partial oxidation, which would be permitted by the iron, would prevent the fouling of the copper, but that the ordinary rapid destruction would be modified.

The 'Magicienne' frigate, having been at sea some time, with cast-iron protectors, was docked at Woolwich for examination; when it was found, that the protection, instead of being partial, had been local, for while the greater portion of the surface of the copper was oxidized as usual, the parts contiguous to the iron had been perfectly protected, and were covered with barnacles. Mr. Marsh, (of the Ordnance Department,) broke off some small pieces of the iron, which presented the appearance of plumbago, was easily cut, was greasy to the touch, and left black marks upon paper*; in a few minutes the heat became so great, as to

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* In Dr. Thomson's "Annals of Philosophy" are the following remarks:—"Dr. Henry states, that 'cast iron having been in contact with muriate of lime, or muriate of magnesia, most of the iron was removed. The specific gravity was reduced to 2·155, and what remained was chiefly plumbago, and the usual impurities.'

"Dr. Brande found, that 'a cast-iron gun had undergone a like change, from being long immersed in sea-water. To the depth of an inch it was converted into a substance, having all the external character of plumbago. The component parts were—

Oxide of iron	81
Plumbago	16
	97

"Mr. Mushet, in his work on 'Iron and Steel,' states, that wrought iron sometimes, though very rarely, undergoes the same change.

"Professor Daniel, in the 'Quarterly Journal of Science,' vol. ii. p. 290, says, 'I am inclined, under all the circumstances, to believe that the triple carburet, as it is at first obtained, consists of iron and silicum in the metalline state, united to carbon. When brought into contact with oxygen gas, the metals become converted to protoxides, giving out heat, without separating from the carbon.'

ignite the paper in which the pieces were enveloped. The development of heat was generally supposed to proceed from the rapid absorption of oxygen by the mass, on being brought into the air, from the water, where it had already received a certain amount of oxygen; the production of heat being, in this case, governed by the same law as that under which animal heat, and the heat of combustion, were developed.

Mr. Homersham said that the water of the Thames, up as high as Richmond, had the same effect as sea-water, in rendering cast iron soft.*

Mr. Simpson believed, that if hard grey cast iron, with a good surface, was used for castings which were subjected to the action of sea-water, but little injurious effect was to be dreaded; he was so convinced of the fact, that he was about to use cast iron extensively for piles. He had recently examined some cast-iron piles, which had been in sea-water for sixteen years, without any detrimental effect being produced.

Mr. Jordan thought that it was very desirable to mark the difference between the composition of brass, and the alloy of copper and tin, used in casting guns. With brass in which zinc formed a part of the composition, it was probable, that the iron would have been acted upon with less energy, because it was more electro-negative than zinc; but the gun-metal acted positively upon the iron, and apparently, altered the substance.

Mr. Braithwaite said, that the proportions of the mixture, used for the bearings of machinery, were usually 92 per cent. of copper and 8 per cent. of tin.

The President said, that although the discussion had taken a direction which had not been anticipated, and was foreign to the original subject, he had not attempted to lead it back again, because the question of the causes of the chemical change in cast iron, in certain positions, and the means of preventing it, was of the utmost importance to engineers, particularly as in all modern works so much cast iron was used.

Mr. J. B. Jordan exhibited and described a model, shewing the principal pump valves used by mining engineers.

Mr. Jordan stated, that the model before the meeting was intended to illustrate mining machinery, and was one of a series, now in progress of construction for the Museum of Economic

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" By analysis, he found the substance to consist of—

Red oxide of iron 7·0 =	6·2	black oxide
	4·9	silex
	11·2	carbon

" The same author states an important fact, bearing on the present question, namely, 'that it took three times as long to saturate an acid, when it acted on white cast iron, as when it acted on the grey kind.' "

* Vide also Trans. Inst. C. E., vol. i. p. 204.

Geology. There were eight differently constructed valves in it, each surmounted by a glass valve-chamber and pipe; the large central pump served to circulate the water through all the valves simultaneously, so as to shew their comparative action; the water was then discharged from the collar launders over each valve, into that at the head of the pump, so that, by repetitions of the pump-stroke, the circulation through the valves might be kept up at pleasure.

The valves shewn in the model might be divided into four classes :—

1st. Those in which no attempt was made to counteract or avoid the violence of the beat, or concussion, on closing the valve.

2nd. Those in which that evil was reduced, by dividing the horizontal area of the valve into several parts.

3rd. Those in which the same object was attained, by reducing the horizontal area of the moving part of the valve.

4th. That in which the concussion was reduced to any desired amount, by making one side or portion of the column, to a certain degree, balance the other.

Valves of the first class were so well known, that they required little description; they were the common pump clack, moving on a leather joint, and having generally a very small water-way —the improved metal joint clack, in which the water-way was much increased—and the ‘ button clack,’ or, as it was called in Cornwall, ‘ Scantlebury’s clack,’ which was a disc of metal with a central spill or stalk, which rose and fell in a guide. Of these valves, the second was considered the best, inasmuch as it had the largest water-way (some portion of which was direct), and it was free from some minor objections, to which the leather-jointed clack was liable. This valve was therefore in very common use in mine pumps, where the area of the pump and the height of the column, were not such as to produce any serious inconvenience from concussion, in closing the valve.

In the second class of valves, the injurious effect of a violent beat was somewhat avoided, by the ingenious expedient of dividing the valve into several rings, or segments. The simplest of this class, was the well-known ‘ butterfly valve,’ in which two semicircular parts opened on a central hinge of leather, and the beat was divided into two parts; but as those closed at the same time, the concussion was principally reduced by the fall not being so great. The next valve was composed of several triangular pieces, opening on leather joints, from the circumference of the valve seating; it had been much used by Capt. Reed, of the Mold Mines, Flintshire, and was reported of favourably by several other mining engineers. It closed with very slight concussion, on account of the area of each part being small, the base of each triangle forming the joint, while the water-way was large, and nearly all direct, admitting the mass of water to pass forward, in lines parallel to the sides of the pump. In the other valves of this class, no leather was used, a circumstance which rendered them more applicable to large pumps, where continuous working was of the utmost importance, particularly in the case of deep mines.

The two annular valves shewn, were invented by Mr. Hosking of the Perran Foundry, and Mr. Jenkyn of the Copper-house Foundry, (Cornwall). The first of these was composed of a series of rings working on a vertical spill, each ring having its seat on the one beneath it; these rings had different areas, and fell in succession through a small space, compared with that which would be requisite if the valve were in one piece, so that the concussion was much reduced, while the water-way was increased; but the latter being all lateral, it was requisite to have a large valve chamber. The beats of this valve were formed of tin.

Mr. Jenkyn's valve differed in construction from the one just described, in having the rings connected with each other by shackle-joints, instead of their working on a vertical spill; the mode of forming the beat was also peculiar; it was composed of two thicknesses of leather, between which, wedges of wood were driven into a groove cast for their reception in the rings; these materials were so placed, that the edges of the leather, and the end grain of the wood, might form the striking surface of the beat, after being turned off in the lathe.

In the third class of valves, which avoided concussion by reducing the horizontal area of the moving parts, were Messrs. Harvey and West's, and Mr. Hosking's double-beat, and Mr. Darlington's cylindrical single-beat valves. The first of these was a modification of the double-beat steam valve, so long used in the Cornish engines; the second named was similar in principle, and was only slightly different in construction. They were good valves, each giving large lateral water-ways, and therefore they required valve chambers of corresponding size, to ensure their perfect action.

Mr. Darlington's cylindrical single-beat valve, was contrived for a large set of pumps under his management, at the Alport Mines (Derbyshire.) The rising column of this pump, was 38 inches diameter and 22 fathoms in height; it was, therefore, desirable, in such a pump, to reduce the concussion as much as was consistent with the power of closing the valve in proper time; this was accomplished, by causing a cylinder to rise over a metal-ring packing in the seating of the valve, so much, as to give a large lateral water-way under the beat, formed by the bottom of the cylinder. This valve was found to act well, but it required a very large chamber for the water to enter; the reason for adopting one, instead of two beats, was to avoid or lessen the leakage, caused by chips getting between either of the beats.

The only valve belonging to the fourth class, was that of

Messrs. Palmer and Perkins; it consisted of an elliptical disc, moving on an axis placed parallel with, and near to, the minor axis of the ellipse, and closing at a considerable angle, against the interior surface of a cylinder. In a valve so constructed, it would be readily perceived, that the concussion might be reduced to any extent, by bringing the working axis nearer to the geometric axis of the ellipse; because the force with which it closed, must depend on the difference of area between the upper and lower portions of the disc. It possessed an advantage in the extent and character of its water-way, over all the other valves described, nearly the whole of the water-passage being parallel to the sides of the pump. On the other hand it was objected, that the axis would be liable to rapid abrasion, and consequently the valve would become leaky; but Mr. Jordan did not concur in the opinion, of that being an insurmountable difficulty, and he hoped that the valve would be tried, under circumstances which would put its merits to a severe test.

Mr. Taylor said, that the subject of valves for pumps had been so ably treated, by Mr. Homersham, in his paper (which was read before the Institution last session), and in the discussion upon it, that there remained but little for him to say. He could not, however, allow the model, which had been exhibited by the permission of Sir Henry De la Bêche, to pass without a few remarks.

In Cornwall, after the improvements in steam-engines had made considerable progress, attention was directed to the more perfect construction of the pumps. The plunger was introduced about that period, and the merit of it has been claimed by different parties*; its use was attended with many advantages, and had now become almost universal.

Some of the benefits derived from its substitution for the common piston or bucket, had no reference to the subject of valves, and therefore need not be mentioned. In one point it was of great importance; for, as the size of the water-way of the valves in the bucket, was necessarily limited by the diameter of the working barrel, an arrangement like that of the plunger pump, which permitted both valves to be fixed in seatings, of which the areas might be increased to any convenient extent, became the more desirable; it was therefore extraordinary, that such tardiness had been exhibited in taking advantage of such an obvious improvement, when the principle had been long known, and the loss of power, consequent on the former system, was admitted. The model, which had been explained by Mr. Jordan, shewed how much the attention of engineers had now been directed to the subject.

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* The plunger was used by Sir S. Morland in 1683, for the force-pumps at the Machine de Marly.

In the discussion of Mr. Homersham's paper, Mr. Taylor had mentioned the advantage which had resulted from the extension of the water-way of some large pump-work, by having two suction-pipes, or wind-bores, and thus doubling the passage through the valves.

It appeared important, for all valves that discharged the water laterally, that more space should be provided round the seatings in which they were placed, and for want of that precaution, some excellent valves had not answered so well as they would otherwise have done. That which was invented by Mr. Darlington, to avoid some inconveniences in the use of the double-beat valves, would have been improved by an enlarged space around it.

As mines increased in depth, and the volume of water became larger; as steam-engines came into use, having a rapid and sudden motion, as compared with that of water-wheels, which were formerly universally employed for pumping, a great inconvenience was felt, from the concussion in the columns of the pumps; this was occasioned by the beating of the valves upon their seats, and in pumps, of the diameter needful for draining some of the mines, this evil became very serious. Almost all the improvements in valves were made with that view; the division of the old butterfly valve into segments was an obvious first step; it had succeeded extremely well, and was still not much excelled. The annular valves of Hosking, Jenkyn, Simpson, and others, were based on the admitted principle, of dividing the falling clacks into several parts, that they should not rise so high, and that they might collapse in succession, and thus avoid concussion.

Harvey and West's double-beat valve partook of that principle, but was stated to have the advantage of presenting a small area to be acted upon by the pressure of the column of water upon it. Darlington's valve, which was contrived to avoid the inconvenience, arising from the leakage, from both the beats of Harvey and West's valve, when any substance obstructed its perfect closing, presented also a small area for the pressure to act upon; but, as it discharged the water laterally, it required an increased space around the seating.

The model exhibited a valve, introduced by Messrs. Palmer and Perkins, upon a principle, by which concussion might be considerably reduced, by bringing into action a part of the superincumbent pressure, to check the descent in closing the orifice. This valve had not yet been tried in large pumps; but the opinions of practical men appeared to be in its favour.*

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* A valve of a very similar construction is described in Belidor's "Architecture Hydraulique," vol. iii. p. 221, as having been introduced by him in 1737, for the improvement of the water-works at the Pont Notre Dame, Paris. The situation of the pivot of the valve, is described to be at one-twelfth part beyond the line of the geometrical diameter of the pump-barrel. A diagram of this valve was exhibited to the meeting.

In the construction of all valves, it was of importance, not only to attend to the points which had been mentioned, but also to their durability, and their facility of removal and repair. The actual cost of the valves was of little importance, when compared with the labour and hindrance in removing, or changing them, where the influx of water was great. Serious expense, and loss of time, were frequently occasioned by such stoppages, and the deeper parts of the mines were exposed to obstructions, which were overcome with great difficulty, notwithstanding many ingenious and well-arranged contrivances, to render the process of repair easy and expeditious. Very powerful capstans and other means were provided for these emergencies, and as the labour of fifty or sixty men was sometimes required to work these machines, it would be easily conceived how important it was, that such operations should occur as seldom as possible, and that the most perfect and durable construction should be aimed at.

Mr. Perkins observed, that although, at the first view, a certain degree of resemblance might appear to exist, between Belidor's valve and the disc valve of Palmer and Perkins, there existed in reality but little similarity between them. The former was placed horizontally, whether used as a clack, or as a bucket; in all cases, it required to be adjusted to a seating formed of reversed cones, like the ring of a steam throttle valve, and it was always attached to a packed bucket or piston; whereas the latter worked at an inclination of about ¼th of the diameter of the pump; it was adjusted within the bored pipe without any seating; and it formed a piston without any packing. Its form being that of an oblique section of a solid cylinder, whose diameter was equal to the interior of the working barrel, and the line of its suspension being beyond the diameter, the areas of the two portions of its surface were unequal; consequently, there was more pressure on one side of the line of suspension than on the other. By this extra amount of pressure, the disc was turned on its axis, allowing a free passage for the water, parallel with the sides of the pump. The closing of the lower valve on the return stroke was, for this reason, without noise or concussion. It was evident also, that as packing was not necessary for the disc piston, and as the rubbing surface of its periphery was very small, the friction must be greatly diminished.

Messrs. Bramah and Robinson made an experiment for comparing a pump, with a packed bucket and butterfly valves, with one having a disc piston; the diameter of both pumps was 10 inches, with a stroke of 8 inches, a lever of six to one, and a lift of water of 5 feet; it was found that the former required a force equal to 460 lbs., and the latter 196 lbs., to complete a stroke.

As regarded their duration; a disc pump 7 inches diameter, with a stroke of 8 inches, and a lift of 40 feet, drawing its water through 600 feet of suction pipe, rising in that length 28 feet vertically, and worked by a steam-engine 26 strokes per minute, had been found, after working nearly night and day, at the Equitable Gas Works, during fifteen months, without repair, to exhibit but little appearance of wear in the piston; and both it, and the clack valve, were perfectly tight.

As the subject appeared to interest the Institution, he promised to present, on a future occasion, a more detailed account of some similar pumps, with the actual results obtained.

Mr. Lowe corroborated the statement of the efficiency and duration of the valve used at the Equitable Gas Works; its friction was necessarily very small, for as it formed at the same time both piston and valve, and in the return stroke, from its nearly vertical position in the working barrel, the parts in contact were reduced to the area of the points of the minor axis of the disc, the friction was in proportion to that area. As a seat valve, he thought it less liable to become defective than any other, as it was scarcely possible for any sand, or other foreign matter, to lodge upon it, and the valves, which he had seen at work, did not shew any symptoms of being so affected.

Mr. Farey said, that it was an axiom relative to steam-engines, that their action became more perfect as their size increased, but that this could not apply correctly to pump valves; for, as their size had augmented, the difficulties in their construction had been more fully developed. With small valves it had been considered, that the vertical height of the lift of a clack, should be one-fourth of the diameter of the barrel, but it was evident that rule could not be adhered to with large valves. Other forms, allowing a free passage for the water, had therefore been resorted to, and with great success, but there was still room for improvement.

He had a high opinion of the valve which had been used originally by Messrs. Boulton and Watt, and which was called, from its form, the 'Bishop's cap.' It consisted of four triangular flaps of leather, hinged on the periphery of the valve, and meeting in the centre; the number of these flaps had been, he believed, increased to six and eight for very large sizes, and they afforded a very free passage for the water.

Much yet remained to be done, in improving the valves of the air-pumps of steam engines, especially in adapting them to the speed of the engine, so as to avoid the loss of power, consequent on drawing or forcing the water through contracted passages.

Mr. Jordan was happy to find his opinion of the disc valve corroborated. He had viewed it almost entirely as a clack valve, on which the whole weight of the column of water would rest, and for that purpose he thought it particularly suited. He could not agree in the opinion that chips of wood or other substances would be liable to accumulate near the axis, and render it leaky. He thought, on the contrary, that it would clear itself very easily, and as the faces or seats were vertical, it was not possible for anything to rest upon them. It had been urged that these valves were difficult of construction, and would scarcely be found tight, under a very heavy column. He conceived, however, that with modern machinery there could not be any trouble in making them perfectly accurate, and that the simple addition of a beard of leather, fixed on the upper side of the longer portion of the valve, and to the seating at the shorter part, would render the valves quite tight.

Mr. Homersham observed, that any particular form and proportion of a valve, which enabled it to answer well, in one situation, was no criterion of its doing the same, under other circumstances; for instance, the suction and delivery valves, of the pump of a Cornish mine engine, required to be differently proportioned; as, in order to follow the speed of the plunger, the water was obliged to move through the former more rapidly than through the latter; for the velocity of the down stroke of the steam piston of a Cornish engine, was chiefly regulated by the portion of the stroke at which the steam was cut off, whereas its velocity in going out, was most usually adjusted by varying the period of the pause at the end of the stroke; although it was also somewhat governed by the number of strokes per minute which were required to be made. Therefore, as the plunger always moved quicker in the former, than in the latter case, the velocity of the passage of the water through the suction valve (unless its area was increased), was greater than through the delivery valve, and the moving part of the valve, against which the water impinged, required to be heavier in the former than in the latter, to insure its closing, before the return stroke of the engine commenced. This had been pointed out in his paper on valves, which was read in the last session*, and a rule was given for their relative weights, which should always be in proportion to the velocity of the water passing through them; if this were not attended to, and they were both made of the same weight, the delivery valve would not open freely, and thus more weight would be required to carry the engine 'outside,' and the duty would be diminished. He was therefore of opinion, that every valve required to be adjusted expressly for the situation in which it was placed, and the duty it was required to perform.

Mr. Galloway drew the attention of the meeting to a pump which was introduced by Mr. Jacob Perkins in in 1820†, and was rewarded by the Society of Arts. The barrel consisted of four boards, nailed together, so that its horizontal section formed a square. The bucket-rod was enlarged to a broad end, intersecting the square diagonally; to this, two valves were affixed by leathern hinges. Their form was that of an isosceles triangle, the base of each being united to the rod, and the other sides resting, in an inclined position, against the inner sides of the barrel, filling the entire area. In the down stroke of the bucket, this form offered little opposition to the water, and was sufficiently tight for common purposes, with but little friction.

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* Vide Minutes of Proceedings, 1843, p. 195.

† Vide "Transactions of the Society of Arts," 1820, vol. xxxviii., p. 106.

Mr. Galloway subsequently constructed a pump with a wooden barrel, in which the valve was in one piece; the preponderating action, like that of the oval disc pump, was effected, by giving the barrel the form of a trapezium, the valve being suspended by an axis, which crossed it at the bases of the two unequal parts. Neither the trapezium valve, nor that of Jacob Perkins, were, he conceived, generally applicable; their utility would not extend beyond domestic purposes, or those countries where the means of boring cylindrical barrels were not attainable.

Mr. Galloway was of opinion, that the principal objections to the elliptical disc valve were, first, that as the axis of the valve did not coincide with the minor axis of the ellipse, the spindle would either bend, on the valve being raised to a vertical position, or it would not fit the cylinder when it was shut; secondly, that there was no compensation for abrasion across the minor axis, so that when the valve was worn, either by the friction of sand or from other causes, it would become leaky.

Mr. Galloway then exhibited a form of valve, by which he submitted these objections would be obviated. If an ellipse was intersected diagonally, at an angle of 45° with the major and minor axes, and one portion was turned over, so as to produce a heart-shaped figure, when joined to the other portion by a hinge; it was obvious that these two leaves, when placed in a cylinder, would fill the cavity as the original ellipse had done; both the minor and major axes being at different angles. These leaves being supported from beneath by rods with ball and socket joints, the wear in any direction would be compensated by the extension of the leaves, as their constant tendency was to become horizontal. The rocking rods, acting at points on the leaves where the preponderance of surface was in one direction, enabled the water to open and close them, with that easy motion which was so much desired in heavy lifts.

Mr. Jordan wished it particularly to be understood, that he had directed attention to the disc valve, hoping that from its simplicity of action, it might be tried and found serviceable, for the clacks of deep mine pumps, of large diameter, and working under a column of from 10 to 50 fathoms in height.

There was little doubt of the valve being tight under ordinary circumstances, and with short lifts, but when a heavy column of water was allowed to rest upon a valve, the slightest inaccuracy was detected.

Mr. Homersham differed in opinion with Mr. Jordan, as to the applicability of the disc valve to deep mine pumps. He conceived there would be a certain amount of difficulty, in constructing them so as to be perfectly tight, under a heavy column of water, and the spindle or pivot of the valve would require to be of large diameter, to insure its being strong enough to bear the pressure. It was also necessary, for the perfect action of the valve of a pumping engine, that it should be closed, by the time the piston of the pump arrived at the top, or the bottom of its stroke; this could only be accomplished, by the weight of the valve balancing the maximum velocity of the water put in motion through it, so that it should begin to close as the flow of water diminished, and be quite closed when the motion of the piston ceased; this, he conceived, it would be difficult to accomplish, with the valve then under consideration.

Mr. Palmer remarked, with reference to these objections, that the opinions given were clearly in opposition to facts, deduced from fifteen months' operation of this pump, raising water under a vertical column of 40 feet, during which period, the slip or loss of water approached nearer to the calculated result, than any pump duty that had come under his observation.

In reference to the second objection, it was quite clear the valve-spindle must be of adequate strength, to support the column of water the pump had to lift; he believed that no greater evil (considered in an abstract sense) could result from the use of a large spindle, than an increased friction at its bearings, and a corresponding loss of velocity in the fall of the valve. These evils were, however, neutralized, by increasing the excentricity of the spindle, and thereby enlarging the valve's area above the spindle, which increased area would always be considered, in reference to the altitude of the column of water above the valve, in order to insure the least loss of water, and at the same time to avoid the percussive action, so detrimental in other pumps.

As regarded the third objection, namely, that there would be great difficulty in keeping the disc-valve perfectly tight, he would remark, that in the pump referred to, the minor axis of the piston was not sensibly worn, while the major axis was shortened 3-20ths of an inch, but still preserving the true elliptic form, and fitting the pump as accurately as when first put into action, although the piston had made upwards of 16,800,000 double strokes, and had travelled over a rubbing surface exceeding 2,100 miles, during the upward or effective stroke.

The wear of the clack-valve at the major axis was less than 1-30th part of an inch, while at the minor axis it had undergone no change, although the number of beats it had made, equalled the number of strokes of the pump.

The modifications of the elliptic disc piston and valve into the trapezium form, as proposed by Mr. Galloway, appeared to him to be attended, not only with a considerable increase of cost in the manufacture, and the fitting of the trapezium-valve, and the working-barrel, but also increasing the amount of rubbing surface, with a corresponding amount of wear and tear, as compared with a pump having the elliptic valve, performing the like amount of duty.

The two semi-elliptic valves proposed by Mr. Galloway, were ingenious, but they were contrived with the view of remedying an evil that did not really exist in the disc-elliptic piston valve, namely, wear and tear of the minor axis, and leakage at the parts supposed to be worn; nor would the action of the two elliptic leaves, he conceived, be as efficient as the simple elliptic disc-piston valve.

February 20, 1844.

The President in the Chair.

The minutes of conversation of the meeting of February 13th, on the paper by Mr. Grantham, describing the vessel called the 'Liverpool Screw,' and on the model exhibited by Mr. Jordan, shewing the various valves used in pumps, were read, and a further discussion upon them ensued, which was extended to such a length, as to prevent any original papers being read.

February 27, 1844.

The President in the Chair.

"Description of a Bridge across the river Shannon at Portumna."

By Thomas Rhodes, M. Inst. C.E.

This paper describes a bridge which has been erected across the river Shannon at Portumna, to form a communication between the counties of Galway and Tipperary, at the spot where a timber bridge formerly stood.

The present structure is composed of straight cast-iron girders, resting upon piers formed of timber piles, leaving thirteen openings of 18 feet 6 inches span each, between the Tipperary shore and Hayes Island, and twelve openings of the same span, between the island and the outer pier of the swivel-bridge, which is 40 feet 6 inches span, and is close to the Galway shore. The total length of the bridge is 558 feet 6 inches, exclusive of the width of Hayes Island, upon the centre of which are placed the toll-house, and a stone obelisk, commemorative of the building of the bridge, under the direction of the Commissioners of the Public Works for Ireland. The width between the balustrades is 17 feet.

The ashlar work and rubble masonry of the abutments of the pier of the swivel-bridge, the toll-house, and the retaining walls, are of Portumna limestone, and are built with hydraulic mortar, the lime of which was burnt from the same description of stone as that used in the building.

In the foundations, the sheeting piles are of red pine; the bearing piles of beech and larch; and the main piles and waling pieces for supporting the roadway girders are of Memel timber.

The earth having been excavated down to the solid strata, of sufficient space for the abutments, retaining walls, counterforts, and the foundations for the swivel bridge (the latter being done by means of two coffer-dams); the foundation or bearing piles, 8 feet long and 10 inches in diameter, were driven 4 feet apart, from centre to centre, along the foot of the abutment walls, and a capping of Dantzic timber 12 inches by 6 inches was spiked to them; the whole area of the foundation under the walls and counterforts, was covered with a thickness of 12 inches of concrete, composed of six parts of clean gravel and sand, and one of lime. A course of flag-stones 7 inches thick was then laid, and the walls were built, being backed with well-pounded clay from the excavations, as the masonry proceeded; the space between the retaining walls was then filled to the underside of the roadway, and levelled to receive the broken stone or metalling.

The ashlar work and backing were laid flush in their respective kinds of mortar, and every course was well grouted, so that the whole might become one solid mass. The mortar was made of Portumna lime, in the proportion of two parts of sand to one of lime, fine sifted and wrought in a pug-mill.

The main piles, 14 inches square, (after being Kyanized,) were driven at least 9 feet into the solid ground, at distances of 20 feet apart, from centre to centre, and were cut off level, at the height of 9 feet 6 inches from the surface of the summer water-level. The caps were then tenoned upon them, all the joints having in them a sheet of patent felt saturated with boiled tar.

The cast-iron girders are 20 feet long, 17 inches deep, and 1¼ inch thick, with a flanch at the top 8 inches wide, to receive the roadway plates, and another at the bottom of 4 inches in width. They are supported by chairs cast in the caps, and are secured by distance pieces. The roadway plates are ⅞ inch thick, secured by bolts and nuts, and the joints made with iron cement. Cast-iron fascia plates are screwed to the outside girders, to carry the wrought-iron balustrade.

Previously to leaving the manufactory of Messrs. J. and R. Mallet (Dublin), where they were cast, all the girders were proved, by placing them on supports 20 feet apart, and suspending from the upper edge a weight of 12 tons, which was made to traverse from end to end of the girder, in order to subject each part to the same test.

The swivel bridge is composed of two leaves, with a clear opening of 40 feet for the navigable channel. The ribs forming the arched part of the bridge, from the abutment to the centre, are each cast in one piece, with flanches at the radiating line, to which the cross tie-plate is bolted; a continuation of each rib is carried across the upper frame, to the circular tie-plate at the end; these have also flanches to correspond with those of the arched ribs, and are bolted together; the flanches on the upper edge of the ribs receive the roadway planking, which is of British oak, 2½ inches thick. The leaves turn on case-hardened iron rollers, and require about 15 tons of ballast to balance them.

The construction is minutely described, with the quantity of materials of all kinds employed, the dimensions of the several parts of the masonry, the timber work, and the cast and wrought iron work.

The specification, the form of tender, and the prices of the various portions, are given, and it is stated that the total cost of the bridge, including the extra work, superintendence, law expenses, &c., was £24,131. 8*s*. 1*d*.

Extracts from the journal of Mr. Smith, the superintendent of the works, give the dates of the commencement and termination of the several parts, from which it appears, that the first stone of the abutments was laid on the 13th September, 1838, and that the whole structure was finished on the 13th January, 1842.

The paper is illustrated by three very complete drawings, copied by Mr. T. H. White from the original designs by Mr. Rhodes: giving the general plan and elevation of the bridge, with enlarged details of all parts of the structure, including the coffer-dams, &c., used in the construction.

March 5, 1844.

The President in the Chair.

"Description of the Bridge over the river Whitadder, at Allanton (Berwick)." By John Thomas Syme.

The road which passes near the village of Allanton, and which forms the means of communication between Dunse and Berwick-upon-Tweed, and joins the main road to Edinburgh, was frequently rendered impassable by floods; in order to avoid this, Miss Boswall, of Blackadder, determined, in the year 1840, to erect bridges over the rivers Whitadder and Blackadder, for which designs were given by Messrs. R. Stevenson and Sons, C.E. (Edinburgh); of these plans, the former only has hitherto been carried into effect.

The bridge described in the paper, crosses the Whitadder, at a point below its junction with the Blackadder; it is of two arches of 73 feet span each, with a versed sine of 11 feet 6 inches, being segments of circles of 66·89 feet radius for intrados, and 72·42 feet for extrados; the voussoirs are 3 feet deep at the springings, and 2 feet 6 inches at the crown. The breadth across the soffit is 22 feet 1 inch, and between the parapets 20 feet, leaving a carriage-way of 15 feet.

The foundations of the centre pier and of the abutments, are on solid sandstone rock, which was found near the surface.

The whole of the masonry is of broached ashlar, except the pilasters, frieze, cornice, and impost courses, and the base and coping of the parapet.

The stone used for the greater part of the work, is a soft red sandstone from adjacent quarries, and that for the springing courses, was procured from Daleky quarry in Fifeshire. The mortar, which was made from lime got at Oxford, a village near Berwick, was composed of one part of lime to two parts of sharp river sand. Roman cement was used for pointing the face joints up to the springing courses, and above that level red oil-putty was used.

Details of the dimensions of all the parts of the structure—the forms and sizes of the centering—the mode of construction, &c., are given, and it is stated, that on striking the centres, the settlements that occurred were 2⅜ inches in one arch, and 2⅝ inches in the other.

The bridge was commenced August 4th, 1840, and was opened to the public, March 27th, 1842. The works, including the approaches, were executed by Mr. Balfour, Balsillie, for £6,058. 8*s.*; Mr. Watson being the resident inspector under the engineers.

The communication is illustrated by four drawings, giving all the details of the construction of the bridge of two arches over the Whitadder, and of that of one arch, proposed to be built over the Blackadder near the same spot.

ON THE LAWS RELATING TO LETTERS PATENT FOR INVENTIONS.

No. XVII.

THE NEW PATENT LAWS OF FRANCE.

We are at length enabled to announce, that the long expected alterations in the French Patent Laws have received the sanction of the French legislature, and will come into operation in a few months. It is now seventeen months since we first laid before the public a copy of the *projet de loi,* as presented to the Chamber of Deputies; and, until within a very short time (indeed, but a few days) it was extremely doubtful whether the new law would have been passed this session.

The *projet de loi,* when first laid before the Chamber of Deputies, contained many objectionable clauses, and proposed several very impolitic restrictions, which, if carried out, would have acted very prejudicially on the interests of both French and foreign inventors; but, to the energetic remonstrances of our talented correspondent, M. Perpigna, and other gentlemen connected with inventions, we are, in a great measure, indebted for the extinction or amelioration of the most objectionable parts. M. Perpigna, in a pamphlet, intituled, "*Observations sur le projet de loi concernant les brevets d'invention,*" commented on the *projet*, clause by clause, and made various practical observations as to the bearing of each article upon the interests of inventors; we are happy to observe, that these strictures have met with due attention, many of the articles being amended in the very words suggested by the author. The Government has also been fortunate in obtaining the opinions of M. Regnault, and various gentlemen interested in the arts and manufactures. As it now stands, the new law cannot but be considered as a great improvement upon the old existing laws, all of which will be repealed immediately upon the new one coming into operation. The most striking difference between the new and the old law is, that the government tax is now to be paid by yearly instalments; and that, upon neglecting to pay the instalment within the proper time, the patent will be void. The inventor will at once see the benefit of this arrangement, as, if a patent fails to answer his expectations, it may be abandoned, without incurring a very heavy pecuniary loss, as is the case at present.

In order to pass the new law this session, it was at last hurried so fast through the Chamber of Peers, that time was not allowed to deliberately examine the amendments that had been previously made in it; the consequence is, that, after all the time spent in discussing its merits, it has been ultimately passed with one or two glaring inconsistencies, but which, fortunately, do not detract from the general utility of the law. It would be impossible upon the present occasion to enter upon a lengthened discussion or analysis of the new law; we shall, therefore, content ourselves with presenting a translation of it, in the shape it passed the Chamber of Peers on the 15th ult., merely observing, that it has not yet been promulgated or gazetted, and that it cannot come into operation until three months after such publication takes place.

ART. 1.—Any new invention or discovery, in any branch of manufacture, entitles its author, upon the conditions and for the terms hereinafter mentioned, to the exclusive right of putting the said invention or discovery into operation, for his own benefit. This right is secured by documents, granted by the government, under the name of Brevets of Invention.

Art. 2.—The following shall be considered as new inventions or discoveries:—The invention of new manufactures; and the invention of new means, or the novel application of known means, for the purpose of obtaining a result, or a manufactured product.

Art. 3.—The following cannot be protected by Brevet:—1st. Pharmaceutical compositions or remedies of any kind; these being subject to laws and regulations made for that purpose, and more particularly to the decree of the 18th August, 1810, relating to secret remedies. 2nd. Financial or monetary plans or combinations.

Art. 4.—The duration of Brevets shall be five, ten, or fifteen years. Each Brevet shall be subject to a fixed tax, namely, 500 fr. for five years, 1,000 fr. for ten years, and 1,500 fr. for fifteen years. These fees must be paid by annuities of 100fr. each, under penalty of forfeiture, if the patentee allows one year to elapse without paying the same.

Art. 5.—Persons wishing to obtain Brevets of Invention, must deposit, under seal, at the office of the Secretary of the Prefecture, in the department in which they reside, or in any other department, on choosing a representative residing there:—1st. His petition to the Minister of Agriculture and Commerce. 2nd. A description of the discovery, invention, or application, forming the subject of the petition. 3rd. The drawings or specimens necessary for the elucidation of the description. And, 4th. A list of the documents deposited.

Art. 6.—The demand, or petition, must be confined to one principal object, with the details thereof, pointing out the purposes to which it is applicable. It must mention the term for which the petitioner wishes to obtain his patent, which must be within the limits fixed in Article 4, and must contain neither restrictions, conditions, nor reservations. It must set forth a title, giving a correct and concise idea of the object of the invention. The description must not be written in any foreign language (*i. e.* it must be in French), and must be written without any alterations or additions. A memorandum must be made in the margin of any words which may be struck out or interlined. It must not contain any weights or measures other than those contained in the table annexed to the law of the 4th July, 1837. The drawings must be in ink, and drawn to a scale. A duplicate of the description and drawings must be annexed to the petition. All the documents must be signed by the petitioner, or some person appointed by him, and, in the latter case, a document, empowering him, must be annexed to the petition.

ART. 7.—No deposit will be received, except on the production of a receipt, certifying the payment of a sum of 100 fr. on account of the fees payable on the patent. A certificate or memorandum, entered, free of expense, by the Secretary-General of the Prefecture, in a register kept for that purpose, and signed by the petitioner, will verify each deposit, pointing out the day and hour when the documents were deposited. A copy of this certificate or memorandum will be delivered to the person depositing, upon payment of the expense of the stamp.

ART. 8.—The patent shall date from the time of the deposit, prescribed in Article 5.

ART. 9.—Immediately after the enrolment of the petition, and within five days from the date of the deposit, the Prefect will transmit the documents, under the seal of the inventor, to the Minister of Agriculture and Commerce, together with a certified copy of the certificate or memorandum of deposit, the receipt verifying the payment of the tax, and, if necessary, the power or warrant mentioned in Art. 6.

ART. 10.—On the arrival of the documents at the office of the Minister of Agriculture and Commerce, the demands will be enrolled, and the patents delivered in the order in which the demands or petitions are received.

ART. 11.—Patents, which have been demanded in the regular manner, will be delivered, without previous examination, at the risk and peril of the inventor, and without guaranteeing either the reality, novelty, or merit of the invention, or the correctness of the description. An order from the Minister, verifying the regularity of the demand, will be delivered to the petitioner, and will constitute the patent. To this will be annexed the certified duplicate of the description and drawings mentioned in Art. 6, after it has been examined, and found to agree with the original. The first copy of the patents shall be delivered free of expense. Any copy which may be subsequently required by the patentee, or his assignees, will cost 25 francs. The expense of drawings, if any, will be defrayed by the patentee.

ART. 12.—All demands or petitions which shall not be according to the formalities prescribed by Nos. 2, and 3, of Art. 5, and by Art. 6, will be rejected. One half of the sum paid will go to the Treasury, but the whole of the sum will be allowed to the petitioner, if he reproduces his petition within three months from the time when notice is given to him that his petition is rejected.

ART. 13.—When, under Art. 3, patents cannot be granted, the fees will be returned.

ART. 14.—A list of all patents granted will be published every three months, by royal order, in the "*Bulletin des Lois.*"

ART. 15.—The term of patents can only be prolonged by a law made for that purpose.

ART. 16.—The patentee or his assignees may, during the whole term of the patent, make any alterations, improvements, or additions, and for this purpose, must go through the formalities prescribed in Art. 5, 6, and 7. These alterations, improvements, or additions, must be verified by certificates, delivered in the same form as the principal one, and will have the same effect, from the date of the demands or petitions, as the original patent, with which they will expire. A tax or fee of 20 fr. shall be paid for each certificate of addition. Certificates of addition, obtained by one of the assignees, shall be available by all the others.

ART. 17.—Any patentee wishing to obtain an original patent for five, ten, or fifteen years, instead of a certificate of addition, for any alteration, improvement, or addition, must comply with the formalities prescribed in Art. 5, 6, and 7, and pay the fees mentioned in Art. 4.

ART. 18.—None other than the patentee or his assignees, acting as above mentioned, can, for the space of one year*, legally obtain a patent for any alteration, improvement, or addition to the subject of the original patent. Nevertheless, any person wishing to obtain a patent for any alteration, addition, or improvement upon a patented invention, may, in the course of the year, draw up and present a petition, which will be transmitted to and remain under seal with the Minister of Agriculture and Commerce. At the expiration of the year, the seal will be broken, and the patent granted. The preference will, nevertheless, be given to any alterations, improvements, or additions for which the patentee himself may, in the course of the year, solicit a certificate of addition, or a patent.

ART. 19.—Any person taking a patent for any discovery, invention, or application, which may interfere with the subject of another patent, shall not be allowed to work the invention already patented; and, on the other hand, the proprietor of the original patent cannot use the invention forming the subject of the subsequent patent.

ART. 20.—A patentee may assign the whole or any part of his patent. The transfer of the whole or part of a patent, either for a consideration, or not, can only be effected by a notarial deed, and on payment of the duty determined by Art. 4. No transfer will be valid, as regards a third party, until it is enrolled at the office of the Secretary of the Prefecture, in the department in which the deed was executed. The enrolment of transfers, and all other deeds by which the transfer is effected, will take place on the production and deposit of an authentic extract from the deed of transfer. A copy of each certificate of inrolment, accompanied by the above-mentioned extract from the deed, will be transmitted by the Prefect to the Minister of Agriculture and Commerce, within five days from the date of the certificate.

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* One year, we presume, from the date of the original patent.—ED.

Art. 21.—A register shall be kept at the office of the Minister of Agriculture and Commerce, on which shall be inscribed the different transfers which may be made of each patent; and every three months all the transfers enrolled shall be published by royal order, as prescribed in Art. 14.

Art. 22.—The licensees of a patent, and those who may have received from the patentee the right of using the invention or discovery, shall have the full benefit of any certificates of addition which may be subsequently granted to the patentee or his assignees. On the other hand, the patentee or his assignees shall have the full benefit of any certificates of addition which may be subsequently granted to the licensees. Any persons having a right to profit by the certificates of addition, may obtain a copy thereof, on paying a fee of 20 fr.

Art. 23.—The descriptions, drawings, specimens, and models of patents granted, will remain, until the expiration of the patent right, deposited at the office of the Minister of Agriculture and Commerce, where they will be open for inspection, free of expense. Any person may, at his own expense, obtain a copy of the said descriptions and drawings, according to the forms which shall be determined in the regulations of Art. 47.

Art. 24.—After payment of the second annuity, the descriptions and drawings will be published, either wholly, or in part. There will also be published, at the commencement of each year, a catalogue, containing the titles of all patents granted in the course of the preceding year.

Art. 25.—All descriptions and drawings, as well as the catalogue mentioned in the preceding article, will be deposited at the offices of the Minister of Agriculture and Commerce, and the Secretary of the Prefecture of each department, where they may be inspected, free of expense.

Art. 26.—On the expiration of the patents, the original descriptions and drawings shall be deposited in the Royal Conservatory of Arts and Trades.

Art. 27.—Foreigners may obtain patents for inventions in France.

Art. 28.—The formalities and conditions determined by the present law, will be applicable to patents demanded or granted, according to the preceding article.

Art. 29.—The author of an invention or discovery already patented in a foreign country, may obtain a patent for the same in France; but the duration thereof must not exceed that of the patents previously obtained elsewhere.

Art. 30.—Patents shall be null and void when granted under the following circumstances: viz.—1st. If the discovery, invention, or application be not new. 2nd. If the discovery, invention, or application be not proper subject-matter for a patent, according to Art. 3. 3rd. If founded upon theoretical principles, methods, systems, discoveries, or ideas, without explaining the application thereof to the arts or manufactures. 4th. If the discovery, invention, or application is found to be contrary to public order, or safety, or to the morals, or laws of the kingdom, without prejudice, in this case, and in that of the preceding paragraph, to the penalties which might be incurred by the manufacture or sale of prohibited articles. 5th. If the title under which the patent is demanded, shall point out any other object than that for which the patent is granted. 6th. If the description annexed to the patent be not sufficient to allow of the invention being carried out thereby; or, if it do not point out clearly and fully, the true means employed by the inventor to effect the same. 7th. If the patent has been obtained contrary to the terms of Art. 18. Certificates of addition obtained for alterations, improvements, or additions, which have nothing to do with the original patent, will be null and void.

Art. 31.—No discovery, invention, or application will be reckoned to be new to which sufficient publicity shall have been given, either in France or any other country, to enable it to be put in operation before the date of the deposit of the demand.

Art. 32.—Patentees will be deprived of their rights under the following circumstances:—1st. Upon non-payment of the annuity at the commencement of each year during the term of his patent. 2nd. If the patentee does not put his invention or discovery to work in France within two years from the date of the signature of the patent, or who shall have ceased to work the same during two consecutive years, unless he shall, in either case, assign good reason for so doing. 3. If any patentee shall introduce into France articles manufactured in a foreign country, similar to those protected by his patent. Models of machines, the introduction of which is authorized by the Minister of Agriculture and Commerce, under the circumstances mentioned in Art. 29, are exceptions to this rule.

Art. 33. Any person who, in his placards, advertisements, prospectuses, marks, or stamps shall call himself a patentee, without being in possession of a legal patent, or after the expiration of a patent, or who, being a patentee, shall set forth the same without these words, "*without warranty from the Government,*" shall be punished by a fine of from 50 to 1000 francs. On the offence being repeated, the fine may be doubled.

Art. 34.—An action for repeal of a patent can be instituted by any person having an interest therein. These actions, as well as all disputes relative to the ownership of patents, will be tried before the Civil Tribunals of the First Instance.

Art. 35.—If the petition is presented against the patentee, and one or more assignees or licensees, at the same time, it will be tried before the Tribunal of the place where the patentee resides.

Art. 36.—The affair will be conducted and judged in the manner prescribed for summary matters, by Art. 405, and the following articles, of the Code of Civil Practice.—It will be communicated to the attorney-general.

Art. 37.—In any case tending to the forfeiture of a patent, the public officers may become the intervening parties, and petition for the absolute repeal of the patent, and may also, themselves, declare the patent to be null and void, in the cases mentioned in Nos. 2, 4, and 5, of Art. 30.

Art. 38.—In the case anticipated by Art. 37, all licensees of the patent, whose titles shall have been registered at the department of Agriculture and Commerce, in conformity with Art. 21, must be made parties to the suit.

Art. 39.—When the nullity of a patent has been definitively pronounced, notice to that effect will be given to the Minister of Agriculture and Commerce, and it will be published in the form mentioned in Art. 14.

Art. 40.—Any infringement upon the rights of the patentee, either by manufacturing the article, or employing the means forming the subject of his patent, shall be punished by a fine, varying from 100 to 2000 francs.

Art. 41.—Any person knowingly receiving, selling, or exposing for sale, or introducing into the French territory, one or more counterfeit articles, shall be liable to the same punishment as infringers.

Art. 42.—The penalties fixed by this law cannot be accumulated, *i. e.*, not more than one penalty can be inflicted at one time. The highest penalty only shall be pronounced for all previous offences on the first proceeding.

Art. 43.—On a repetition of the offence, besides the fine, an imprisonment of from one to six months may be inflicted; and for this purpose a previous conviction, within the last five years, must be proved, for one of the offences mentioned in this law. An imprisonment, varying from one to six months, will also be inflicted upon any person who shall have obtained information concerning the invention patented, from any workman or person employed by the patentee. In this case, the workman or person employed may be proceeded against as an accomplice.

Art. 44.—Article 463 of the Penal Code is applicable to the offences alluded to in the preceding articles.

Art. 45.—An action at law, for the imposition of the above-mentioned penalties, can never be instituted by the Government, except upon the complaint of some aggrieved party.

Art. 46.—The legal tribunal, before whom an action for infringement is tried, shall decide and give judgment upon the objections made by the defendant; whether they relate to the nullity or avoidance of the patent, or to questions connected with the property of the said patent.

Art. 47.—Patentees may, by virtue of an order from the President of the *Tribunal de Première Instance*, proceed with the proper officers, and take an inventory, describing all articles suspected to be infringements, either with or without seizing them. The order shall be granted upon a simple demand, and upon the production of the patent: it shall contain, if necessary, the name of some person competent to assist the officer in his description. When a seizure takes place, the said order shall require security of the petitioner, and this security must be forthcoming before the seizure can take place. Security shall always be required of a foreign patentee, who may require a seizure. A copy of the inventory, or the document describing the articles which are seized, as well as of the order, and the document proving the deposit of the security, shall be left with the defendant, upon pain of an action for damages against the officer.

Art. 48.—In default of the plaintiff proceeding by civil or other action within eight days (besides allowing a day for three myriametres* of distance between the place where the articles describedor seized were found and the residence of the infringer, receiver, introducer, or vendor) the seizure or description shall be of no effect, and without prejudice to the damages that may be claimed, according to the form prescribed by Art. 34.

Art. 49.—The confiscation or forfeiture of all articles condemned as infringements, and all tools, apparatus, and utensils employed in their manufacture, shall (even in cases where no damages are given) be pronounced against the infringer, receiver, introducer, or vendor. The forfeited articles shall be handed over to the proprietor of the patent, without reference or prejudice to further damages, or without being condemned to advertize, if thought necessary.

Art. 50.—Royal ordinances, making any regulations in the administration of public business, shall decree the arrangements necessary for the execution of the present law, which shall not come into effect until three months after its promulgation.

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* A myriametre is equal to about six English miles.

Art. 51.—Ordinances issued in the same manner may extend the application of the present law to the colonies with such modifications and alterations as may be deemed necessary.

Art. 52.—The following laws shall be repealed from the day on which the present law shall come into force, viz. the law of the 7th Jan. and 25th May, 1791, that of the 20th Sept. 1792, the decree of the 17th Vendemaire, in the year VII, the decree of the 5th Vendemaire in the year IX, the decree of the 25th Nov. 1806, and 25th Jan. 1807, and all arrangements or regulations made previous to the present law relative to patents of invention, importation, and improvement.

Art. 53.—All patents of invention, importation, and improvement, actually in operation, and issued in conformity to the laws anterior to the present, or prolonged by royal ordinance, shall retain their effect during the time that shall have been originally assigned to them as their duration.

Art. 54.—Proceedings commenced before the promulgation of the present law, shall be finished or completed conformably to the previous laws. Any action, either for infringement or repeal of a patent, if not yet commenced, shall be carried on or conducted according to the regulation prescribed in the present law, even when the patents in question shall have been previously obtained.

Scientific Adjudication.

VICE-CHANCELLOR'S COURT.

Before Sir L. Shadwell.—February 13th, 1844.

PATTESON v. HOLLAND.

Mr. Bethell, Mr. Wood, and Mr. Malins were for the plaintiff; and Mr. Stuart, Mr. Grove, and Mr. Heathfield for the defendant.

The plaintiff is the assignee of a patent which was granted to H. W. Craufurd, on the 29th of April, 1837, for "an improvement in coating or covering iron and copper, for the prevention of oxidation*;" and the defendant is the proprietor of a patent obtained by E. Morewood, on the 27th of August, 1841, for "an improved mode of preserving iron and other metals from oxidation or rust†;" both inventions being communicated from abroad. The plaintiff's invention consists in coating the metal with zinc; which may, in some cases, be covered with a coat of pure tin, or of tin alloyed with lead; and the defendant's invention consists, in first tinning the articles, and then applying a coat of zinc. This last invention the plaintiff alleged to be the same, in effect, as his own, with a mere colorable variation; and he now moved for an injunction to restrain the infringement. On the part of the defendant, it was argued, that the plaintiff's patent was invalid (reference being made to the ordinary process of tinning, and the description in chemical books, of the principle of resisting oxidation by a coating of metal), and, moreover, that there was no infringement.

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* See Vol. XII. of our Conjoined Series, p. 65.

† See p. 117, of our present volume.

The Vice-Chancellor said, the only question was, whether the Court ought to interfere by injunction, as it was manifest that the principle claimed by the plaintiff's patent was known and published as long ago as 1807; and, therefore, that it was a very fit case for the opinion of a court of law. It was shewn that the plaintiff's patent had not been brought into active use for many years; and, although this was no reason why the Court should not interfere to protect the patent, yet the probable mischief that might arise from the sale of the defendant's invention was much diminished by this circumstance; and it might, on the other hand, be a great injury to the defendant to interfere now by injunction. He thought, therefore, the proper thing to do was, to make no order on the motion, but to direct the plaintiff to bring an action to establish his patent, with liberty to either party to apply to the Court.

SOUTH LANCASHIRE SPRING ASSIZES.

NISI PRIUS COURT.

(Before Mr. Baron Rolfe, and a Special Jury.)

April 10th and 11th, 1844.

POW *v.* TAUNTON AND ANOTHER.

Mr. Rotch, Mr. Crompton, and Mr. Webster, were for the plaintiff; and Mr. Temple, and Mr. J. Henderson, for the defendants.

This was an action for the infringement of a patent, obtained February 28th, 1837, by Mr. Robinson, for "a nipping lever, for causing the rotation of wheels, shafts, or cylinders, under certain circumstances," which was afterwards purchased by the plaintiff. The nipping lever had been extensively employed for giving additional power to ships'-windlasses; and the defendants, Messrs. Taunton and Holt, were said to have infringed the plaintiff's patent, by using an invention for which letters patent were granted to Mr. Taunton, on December 11th, 1841.

The defence set up was, that a material distinction existed between the levers used in the two inventions; that the application of the lever in the defendant's invention was not nipping, as in the plaintiff's patent, but locking and driving; and that the invention described in the specification of the plaintiff's patent was not new, but merely a new application of a carpenter's crowbar.

The jury, after a brief consultation, found a verdict for the plaintiff—damages 40*s*.

PRIVY COUNCIL.

May 20th, 1844.

DEROSNE'S PATENT.

THIS was an application on behalf of Charles Derosne, a French gentleman, for an extension of a patent, which was granted to him on the 29th of September, 1830, for improvements in refining sugar.* The Solicitor-General and Mr. Godson appeared for the petitioner; and Mr. Waddington, in the absence of the Attorney-General, on behalf of the Crown.

The invention consisted in decoloring the syrups by passing them through a filter composed of charcoal, prepared from *bituminous schistus*, alone, or mixed with animal charcoal, or of animal charcoal alone, whereby a saving of 2*d*. per pound in refined sugar was gained by the public, and the quantity of ox-blood used in the process was very considerably reduced. It appeared that the public were thenceforward enabled to consume sugar equal in quality to the double-refined prior to this invention, at little more than the former cost of the coarsest quality; and that what before cost 10*d*. per pound, might now be had for 8*d*. Charcoal had been used before, but was pulverized only, and thrown into the sugar *en masse* (as isinglass with coffee), to take off the impurities and coloring matter. By this invention the impurities and coloring matter were cleared away, and the charcoal, thus used, admitted of being thoroughly cleansed, and used again and again. The patentee had been obliged to appoint an agent in England, and to go to Jamaica; and, although he had granted licenses and received large sums, yet he had not gained, clear of expenses (principally law charges,) more than about 5,000*l*. It was urged on his behalf, in favour of the extension, that very great credit was due to him; that the public had been very considerably benefited; and that he had a fair claim to be more amply rewarded, by the extension, which he now sought, being granted.

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* For a full description of this invention, see Vol. VII. Second Series, of the London Journal of Arts, &c. page 74.

Lord BROUGHAM briefly delivered the judgment of the Court. Their Lordships laid down this rule—that, first, there must be some invention; and secondly, there must be a benefit to the public, and a very considerable one, to warrant the extension of a patent. Here the benefit to the public did appear very considerable, as very considerable profit had accrued to the public; whilst the inventor had not profited very extensively. Under these circumstances their Lordships thought it right, that there should be a larger extension than they would concede under ordinary circumstances. Their Lordships granted the extension for six years from the time at which the former patent would, in this present year, have expired.

COURT OF EXCHEQUER.

(Sittings at Nisi Prius, at Westminster, before Mr. Baron Parke and Common Juries.)

June 3rd and 4th, 1844.

HEATH *v.* UNWIN.

MR. JERVIS and Mr. Ogle, were for the plaintiff; and Mr. Martin, Mr. Humfrey, and Mr. Phinn, for the defendant.

This was an action to recover damages for an alleged infringement, by the defendant, of one part of an invention, for which a patent had been granted to the plaintiff, on the 5th of April, 1839, under the title of "certain improvements in the manufacture of iron and steel." * A previous action had been brought by the plaintiff, last year, in the sittings after Trinity Term, before Lord Abinger; the plaintiff was then nonsuited, but obtained a rule for a new trial, on the ground that the Lord Chief Baron had misdirected the jury.†

The part of the plaintiff's invention which was stated to have been infringed, consists in employing carburet of manganese in making cast steel, by introducing into a crucible common blistered steel (broken into fragments, as usual), or mixtures of cast and malleable iron, or malleable iron and carbonaceous matters, together with from one to three per cent. of their weight of carburet of manganese; the crucible is then exposed to the proper heat for melting the materials, and, when in a fluid state, the metal is poured into an ingot mould, in the ordinary manner. Carburet of manganese was found to answer perfectly in this manufacture; and, by its help, cast steel could be made, which had the novel property of being easily welded with iron. Mr. Heath made considerable quantities of steel by his patent process; but, subsequently, he found that a similar effect would result from employing the elements of the carburet, in certain proportions, without first making that article, and using it entire. This was the process employed by the defendant, and alleged to be an invasion of the plaintiff's patent right.

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* For description of this invention, see Vol. XV. of our present Series, p. 221.

† On that trial, as in the present, the infringement was stated to consist in the use of the elements, carbon and manganese, of which the carburet of manganese was composed, instead of the carburet itself, as described in the plaintiff's specification. Lord Abinger then gave as his opinion, that there was no proof of any infringement; for the defendant had not used the thing for which the plaintiff had taken out his patent; although, as was the fact, the same result might have been obtained by the use of those elements of which that compound was made.

The defendant pleaded that the plaintiff was not the first and true inventor of this process; and that his specification and disclaimer did not sufficiently set forth the manner in which the steel was to be prepared. Defendant is now in the trade at Sheffield, and was once in treaty to become an agent for the plaintiff.

Mr. W. Johnson, of Chelsea, stated, that the plaintiff made experiments at his works, and afterwards took the adjoining premises; the new process was discovered in 1840, when the patent had been worked about six months.

Mr. Bevans, of the Vauxhall-road, stated that he was employed by the plaintiff, at Chelsea; that, being short of the carburet of manganese, in the year 1840, he used the black oxide; having first, at Mr. Heath's suggestion, mixed it with coal-tar. This substitute answered perfectly, the carburet being yielded in proportions of 25 per cent., on its ingredient.

Mr. Bellamy, of Sheffield, was engaged by defendant as his steel melter; a box was sent him from defendant's warehouse, in Orchard-street, secured by a double patent lock, and containing packets of a substance he was to use in the process.

Mr. Matthews, cutler, of King's-Head-court, Fleet-street, received some steel of defendant, which he considered to be the same as that manufactured by Mr. Heath.

Mr. G. Lewin went to defendant's manufactory, at Sheffield, in May last, and obtained two of the packets above mentioned, which he gave to Dr. Ure and Mr. Warrington to examine.

Mr. Mushet, the author of "Papers on steel and iron," being examined, stated, that the steel could be made under £15 per ton, the manganese costing £10 per ton. The carburet of manganese would become metallized in the process of its uniting with steel. The argillaceous iron-stones of this country contain 2½ per cent., and calcareous iron-stones, from the Forest of Dean, 4 per cent., of manganese. In some of the foreign factories, the heat of the blast-furnace was applied to the surface of the metals, and being differently diffused through the mass, various kinds of metal were produced from the same batch, from steel to wrought-iron.

Dr. Ure said, there was no such thing as true iron to be had; but the chemist, at great expense, could obtain an approximation to it. The carburet of manganese drove the impurities away from the steel; they rose to the surface in the form of a glass, which contained manganese: steel does not contain any of that substance. He had analyzed the contents of the packet which he received from Mr. Lewin, and found it to consist of 20 parts of coal-tar, and 80 of manganese: the manganese and carbon must metallize before they can act efficiently upon the steel. Professor Schafhaeutl, of Munich, has recently written on this subject in the Philosophical Magazine, where he has treated it in a manner that embodies the most recent discoveries. He analyzed the steel of one of the hardest razors of Mr. Rogers, of Sheffield, in which he did not find a particle of manganese, thereby confirming his own researches.

Mr. Warrington confirmed the accounts given by the previous witness.

Mr. Martin submitted that his learned friends should be called, as they were bound to shew the novelty of the three processes described in the specification, other than that which formed the subject of the action.

His Lordship thought that this had been already done, but reserved the point.

For the defence it was contended, that the invention claimed by the plaintiff was, in reality, no new invention, inasmuch as the same ingredients had been in use many years prior to the date of the plaintiff's patent. Evidence was called in support of this position, but failed in satisfactorily establishing the fact.

Mr. Baron Parke left it to the jury to say, whether, this being a patent, there had been an infringement of it by the defendant; whether the plaintiff had used the proportions of oxide of manganese set out in his specification; whether the invention of the plaintiff was new; and, lastly, whether the specification was sufficient. The jury retired, and after an absence of three quarters of an hour, returned a verdict for the plaintiff on all the issues. The verdict was then entered for the plaintiff—damages one shilling; with leave to the defendant to move to enter a verdict in his favour on the first issue.

List of Patents

Granted by the French Government from the 1*st of October to the* 31*st of December,* 1841.

(Continued from Page 304, Vol. XXIV.)

PATENTS FOR TEN YEARS.

Jalabert-Ventujol and Vallauri, of Nimes, for a machine for carrying building materials.

Labry, of Marnigues, for a means of preparing skins, and coloring the wool adhering to the same.

Lafont, of Bordeaux, for improvements in clocks.

Mamelin, of St. Martin-Boulogne, for grooved tiles to be used for covering houses.

Miergue, of Andure, for improved means of winding the silk from the cocoons.

Millioz, of Grenoble, for a safety-frame for carriages.

Montegu, of Lyon, for a machine for spinning silks.

Nasmyth, of Bordeaux, for improvements in the refining of sugar.

Regnier-Poncelet, of Liege, for an apparatus for working with expansion steam-engines.

Renis, of Montauban, for a machine for shearing all kinds of fabrics.

Revel-fort, of Toulouse, for an improved weighing-machine.

Robert, of Paris, for an improved chimney for lamps.

Sanguinêde and Capt, of Geneva, for tempered steel strings for pianos.

Sedillon, of Paris, for improvements in the means used for producing light.

Simonin, of Paris, for a preparation of a certain vegetable substance to be used as a substitute for quinine.

Tard, of Paris, for a new mode of filtering animal or vegetable oils, wines, vinegars, &c.

Thirion, Toupiant, and Rabouin, of Montmartre, for improvements in pumps.

Turmel, of Paris, for an apparatus for making tea, coffee, &c.

Trouiller, of Valence, for a new system of stop-escapement.

Verdier, of Paris, for an improved close-stool.

PATENTS FOR FIVE YEARS.

Arnut and Gérard, of Saintes, represented in Paris by M. Perpigna, advocate, 2 ter, Rue Choiseul, for an improved hydraulic wheel.

Aubugeau, of Havre, represented by M. Perpigna, for an improved steam-engine.

Bouard, of Joigny, represented by M. Perpigna, for an improved press.

Dantin, of Auxerre, represented by M. Perpigna, for an improved iron bedstead.

Garnier, of Paris, represented by M. Pergigna, for a machine for heckling flax.

Ban, of Villecresnes, for fastenings for wooden shoes.

Bankoski, of Paris, for coats without a wrong side.

Beunet, of Paris, for an improved construction of furnaces and fire-places.

Beslay, of Paris, for pipes called *vegeto-asphaltic*.

Berton, of Douay, for an improved wheel.

Blessing, of Rouen, for improvements in clock-work.

Botten, of London, for improvements in gasometers.

Breton, of Paris, for an improved truss.

Briet, of Paris, for a portable apparatus for preparing gaseous liquids.

Brunette, of Paris, for an improved crane.

Carrière and Aubry, of Paris, for a machine for extracting and removing earth.

Chalas, of Paris, for an essential oil for the toilet.

Chavepeyre, of Paris, for an improved generator.

Coutier, of Paris, for disinfecting and bleaching of animal matters.

David, of Paris, for means of manufacturing wheel tires.

Delvard, of Valenciennes, for a grate for burning coke.

Dufeu of St. Hilaire, of Paris, for an improved wheel-barrow.

Dunaud and Jarrin, of Paris, for improvements in lamps.

Dupuy, of Viezelanges, for means of extracting the saccharine matter from acorns.

Faucheux, of Laville-aux-bois, for a machine for making boxes for the preservation of alimentary substances.

Fontaise, of Valenciennes, for an apparatus for preventing chimnies from smoking.

Gervais, of Paris, for an improved buckle.

Gervais, Mareschal, and Bride, of Lyons, for a machine for setting the bolts and points used in bobbinet frames.

Girardot, of Savigny-sous-Baume, for an improved press.

Godard, of Paris, for a machine for excavating earth.

Goupil, of Paris, for improvements in casting type.

List of Disclaimers
OF PARTS OF INVENTIONS AND
Amendments
MADE UNDER LORD BROUGHAM'S ACT.

William Young,—disclaimer to patent, dated 28th May, 1842, for "improvements in lamps and candlesticks." Filed 29th April, 1844.

Pierre Frederick Ingold,—disclaimer to patent, dated 21st December, 1843, for "improvements in machinery for making parts of watches and other time-keepers, as well as parts of instruments for mathematical, optical, astronomical, nautical, and musical purposes." Filed 19th June, 1844.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

June 6. *George Knight*, of Foster-lane, London, for an air-tight stopper for aerated-liquor bottles.

6. *Ralph Wilson*, of 30, Edward-street, Portman-square, for a coat or garment designed for the preservation of life against drowning.

6. *Francis Baildon Oerton*, of Walsall, Staffordshire, for a harness tug.

11. *Ebenezer Spencer*, of 230, Shoreditch, for a machine for cutting splints.

11. *Isaac Suggitt*, of Howden, in the county of York, for a lamp for burning spirit.

11. *William Sangster*, of Regent-street, Westminster, for the lunette parasol or umbrella.

12. *Hargrave, Brothers*, of Wood-street, Cheapside, London, for an improved stick and runner for umbrellas and parasols.

12. *William Crosskill*, of Beverley, for "Torr's pig trough."

14. *Richard Hornsby*, of Spittlegate, near Grantham, Lincolnshire, for a feed apparatus for agricultural machines.

14. *James Wilson*, of 37, Walbrook, London, for an apparatus for shaping hat linings.

June 15. *Webster & Johnson*, of Sheffield, Yorkshire, for an improved pit and frame saw.

17. *Fletcher & Woolley*, of 180, High Holborn, in the county of Middlesex, for a design for the shape and configuration of lamps with flat wicks, to burn camphine, naphtha, resineine, oils, and such like substances; with an improved method of raising the fluid up to the wick; and which may be applied to other purposes, such as inkstands, &c.

25. *Frederick Fovaux Weiss*, of the Strand, for an improved injecting syringe.

25. *John Warr*, of Canal-street, Derby, for an improved cooking apparatus.

List of Patents

That have passed the Great Seal of IRELAND, from the 17th April to the 17th of June, 1844, inclusive.

To James Johnston, of Wilton Park, Greenock, for improvements in steam boilers.—Sealed 18th M ay

William Scott, of Bolton-street, Piccadilly, in the county of Middlesex, Esq., for certain improvements in the manufacture of fuel,—being a communication from abroad.—Sealed 20th May.

William Johnston, of Richmond Hill, in the county of Surrey, Esq., for improvements in machinery for boring, cleaning, cutting, and dressing of stone and slate, of such kinds as are or may be used for building and for ornamental purposes, and for paving of public and private highways.—Sealed 25th May.

James Champion and Thomas Marsden, both of Stafford, in the county of Lancaster, machine-makers, for improvements in drawing, winding, and spinning cotton and other fibrous substances.—Sealed 29th May.

William Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, civil engineer, for an invention of improvements in extracting certain metals from certain ores, or other compounds of these metals; also, improvements applicable to obtaining another product or other products from such ores or compounds,—being a communication from abroad. —Sealed 4th June.

John Lee, of Newcastle-upon-Tyne, Esq., for improvements in obtaining products from sulphurets, and other compounds containing sulphur.—Sealed 5th June.

Frederick William Etheridge, of Furnival's Inn, in the county of Middlesex, Gent., for certain improvements in the manufacture of bricks, tiles, and tubes.—Sealed 17th June.

List of Patents

Granted for SCOTLAND, subsequent to May 22nd, 1844.

To William Etheridge, of Furnival's Inn, London, for improvements in the manufacture of bricks, tiles, and tubes.—Sealed 27th May.

William Basford, of Burslem, Staffordshire, brick and tile manufacturer, for certain improvements in the mode of manufacturing bricks, tiles, quarries, and certain other articles made or composed of clay and brick earth, and of burning and firing the same, and certain articles of pottery and earthenware.—Sealed 27th May.

William Johnson, of Richmond Hill, in the county of Surrey, for certain improvements in machinery for boring, clearing, cutting, and dressing stone and slate of such kinds as are or may be used for building and for ornamental purposes, and for paving of public and private ways.—Sealed 28th May.

John Taylor, of Duke-street, Adelphi, London, for certain new mechanical combinations, by means of which economy of power and of fuel is obtained in the use of the steam-engine,—being a foreign communication.—Sealed 29th May.

William Walker, jun., of Brown-street, Manchester, hydraulic engineer, for improvements in warming and ventilating apartments and buildings.—Sealed 29th May.

James Fenton, of Manchester, engineer, for an improved combination or alloy or improved combinations or alloys, of metals applicable to various purposes for which brass and copper are usually employed, in the construction of machinery,—being a foreign communication.—Sealed 31st May.

Joseph Cowen, of Blaydon Burn, near Newcastle-upon-Tyne, merchant, for certain improvements in making retorts for generating gas for illumination.—Sealed 5th June.

Joshua Proctor Westhead, of Manchester, cotton-spinner, for a new and improved fabric or new and improved fabrics, and also certain modifications of machinery for making the same, which modifications of machinery are applicable to the manufacture of woven fabrics.—Sealed 6th June.

Wilton George Turner, of Gateshead, in the county of Durham, Doctor in Philosophy, for the manufacturing of salts of ammonia and compounds of cyanogen, from a substance never before applied to that purpose.—Sealed 10th June.

Robert Rettie, of Gourock, near Greenock, Renfrewshire, civil engineer, for improvements in gridirons, frying-pans, and other cooking utensils, and heating apparatus.—Sealed 13th June.

New Patents

SEALED IN ENGLAND.

1844.

To Benjamin Pitt, of George-street, York-street, Westminster, machinist, for certain improvements in the construction of locks and latches, spindles and knobs, applicable to doors, and other similar purposes. Sealed 14th May—6 months for inrolment.*

Charles Anthony Deane, of Poplar, for improvements in constructing, propelling, and steering vessels. Sealed 30th May—6 months for inrolment.

Robert Hazard, of Clifton, near Bristol, confectioner, for improvements in baths. Sealed 30th May—6 months for inrolment.

John Lee, Esq., of Newcastle-upon-Tyne, for improvements in obtaining products from sulphurets, and other compounds containing sulphur. Sealed 30th May—6 months for inrolment.

James Fenton, of Manchester, engineer, for an improved combination or alloy, or improved combinations or alloys, of metals applicable to various purposes for which brass and copper are usually employed, in the construction of machinery. Sealed 30th May—6 months for inrolment.

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* This patent was, by accident, omitted in our last month's list.

Walter Noak, of West Bromwich, Staffordshire colliery agent, and John Noak, of the same place, engineer, for improvements in the manufacture of salt, and in the apparatus to be used therein. Sealed 1st June—6 months for inrolment.

Edward Massey, of King-street, Clerkenwell, watchmaker, for improvements in apparatus for ascertaining the rate at which vessels are passing through the water; also applicable in ascertaining the rate at which streams or currents are running. Sealed 1st June—6 months for inrolment.

James Murdoch, of Staple-inn, Middlesex, mechanical draftsman, for certain improvements in the manufacture of gas, and in the apparatus employed therein,—being a communication. Sealed 4th June—6 months for inrolment.

William Henry Phillips, of Bloomsbury-square, Middlesex, engineer, for certain improvements in the means and apparatus for subduing and extinguishing fire, and saving life and property, and in obtaining and applying motive power, and improvements in propelling. Sealed 4th June—6 months for inrolment.

George Chapman, of Claremont-terrace, Strangeways, Manchester, engineer, for certain improvements in steam-engines. Sealed 4th June—6 months for inrolment.

Henry Boden, of Derby, lace manufacturer, for an improvement in the manufacture of bobbin-net, or twist lace. Sealed 4th June—6 months for inrolment.

Joseph Cowen, of Blaydon Burn, near Newcastle-upon-Tyne, merchant, for certain improvements in making retorts for generating gas for illumination. Sealed 4th June—6 months for inrolment.

William Ward, of Leicester, hosier, and David Winfield Grocock, of the same place, frame-smith, for improvements in machinery for manufacturing frame-work knitted, or netted work. Sealed 4th June—6 months for inrolment.

William Elliott, of Birmingham, button manufacturer, for improvements in the manufacture of covered buttons. Sealed 4th June—6 months for inrolment.

Paul Griffiths, of Holywell, in the county of Flint, millwright, for improvements in washing the products evolved from furnaces. Sealed 4th June—6 months for inrolment.

Joseph Woods, of Bucklersbury, in the city of London, civil engineer, for improvements in producing designs and copies, and in multiplying impressions either of printed or written surfaces,—being a communication. Sealed 6th June—6 months for inrolment.

David Cheetham, of Rochdale, Lancashire, cotton-spinner, and Edward Briggs, of the same place, hat-manufacturer, for certain improvements in the manufacture of hats, and in the machinery or apparatus connected with such, or similar manufacture. Sealed 6th June—6 months for inrolment.

William Higham, of Nottyash, near Liverpool, and David Bellhouse, of Liverpool, aforesaid, merchant, for improved constructions of boilers for evaporating saline and other solutions, for the purpose of crystallization. Sealed 6th June — 6 months for inrolment.

Edmund Morewood, of Thornbridge, Derbyshire, merchant, and George Rogers, of Stearndale, same county, Gent., for improvements in coating iron with other metals. Sealed 8th June—6 months for inrolment.

Elijah Galloway, of Nelson-square, Blackfriars-road, Surrey, for machinery for connecting axes or shafts, whereby, when in motion, they revolve at different relative velocities. Sealed 12th June—6 months for inrolment.

Thomas Farmer, of Birmingham, manufacturer, for certain improvements in the ornamenting of papier-mâché, and in manufacturing and ornamenting japanned goods generally. Sealed 12th June—6 months for inrolment.

George Kent, of Constitution-row, Grays-Inn-road, blind maker, for improvements in machinery for cleaning, polishing, and sharpening knives, forks, and other articles. Sealed 12th June—6 months for inrolment.

Moses Poole, of Serle-street, Middlesex, Gent., for improvements in wheels and axles,—being a communication. Sealed 12th June—6 months for inrolment.

John Swindells, of Manchester, manufacturing chemist, for several improvements in the preparation of various substances for the purpose of dyeing and producing colour; also improvements in the application and use of several chemical compounds, for the purpose of dyeing and producing colour, not hitherto made use of. Sealed 12th June—6 months for inrolment.

Alexander Simon Wolcott, of Manchester, machinist, for improvements in roving and spinning cotton, wool, and other fibrous substances. Sealed 18th June—6 months for inrolment.

Charles William Graham, of King's-Arms-yard, London, merchant, for improvements in manufacturing pathological, anatomical, zoological, geological, botanical, and mineralogical representations in relief, and arranging them for use. Sealed 18th June—6 months for inrolment.

George Wilson, of Saint Martin's-court, Saint Martin's-lane, stationer, for improvements in the cutting of paper for the manufacture of envelopes, and for other purposes. Sealed 19th June—6 months for inrolment.

William Sutcliffe, of Bradford, Yorkshire, manufacturer, for improvements in preparing, dyeing, sizing, or dressing, dyeing, and winding, yarns and manufactured fabrics of wool, flax, cotton, silk, and other fibrous materials. Sealed 19th June—6 months for inrolment.

Pierre Armand Le Comte de Fontainemoreau, of Skinner's-place, Size-lane, for a new mode of locomotion, applicable to railroad and other ways,—being a communication. Sealed 21st June—6 months for inrolment.

Thomas Lever Rushton, of Bolton-le-Moors, Lancashire, iron manufacturer, for certain improvements in the manufacture of iron. Sealed 21st June—6 months for inrolment.

Christopher Phipps, of River, near Dover, paper manufacturer, for an improvement or improvements in the manufacturing of paper, and in marking, writing, and other papers, or in the machinery employed for those purposes,—being partly a communication. Sealed 21st June—6 months for inrolment.

James Shaw, of Sheffield, manufacturer of Britannia metal articles, for improvements in the manufacture of metal dish covers, and metal dishes. Sealed 24th June—6 months for inrolment.

Rees Davies, of Ystradgunlais, Brecon, Gent., for improvements in the manufacture of iron. Sealed 24th June—6 months for inrolment.

William Worby, of Ipswich, for improvements in the manufacture of bricks, tiles, and other articles, from plastic materials. Sealed 24th June—6 months for inrolment.

Charles Maurice Elizée Sautter, of Austin Friars, Gent., for improvements in piano-fortes. Sealed 26th June—6 months for inrolment.

CELESTIAL PHENOMENA FOR JULY, 1844.

D.	H.	M.	
1			Clock before the sun, 3m. 30s.
	—		☽ rises 9h. 0m. A.
	—		☽ passes mer. 0h. 47m. M.
	—		☽ sets 5h. 15m. M.
	—		Occul. r^1 Capricorni, im. 15h. 39m. em. 16h. 42m.
	15		☿ in conj. with Juno, diff. of dec. 7. 11. N.
	17	26	♄ in conj. with the ☽ diff. of dec. 4. 52. S.
2	10	15	☉ in Apogee
5			Clock before the sun, 4m. 14s.
	—		☽ rises 10h. 29m. A.
	—		☽ passes mer. 4h. 10m. M.
	—		☽ sets 10h. 23m. M.
6	4	54	♃ in conj. with the ☽ diff. of dec. 6. 43. S.
7	10	50	☽ in □ or last quarter
	12	54	♃'s first sat. will im.
	9	42	♅ in conj. with the ☽ diff. of dec. 5. 57. S.
9	11	46	☿ in the ascending node
10			Clock before the sun, 5m. 1s.
	—		☽ rises Morn.
	—		☽ passes mer. 7h. 53m. M.
	—		☽ sets 3h. 57m. A.
	5		☽ in Apogee
11			Pallas stationary
	5	20	♅ stationary
	13	17	♃'s second sat. will em.
12			Ceres stationary
14	1	14	☿ in Perihelion
	10	34	☿ in conj. with ☽ diff. of dec. 3. 35. N.
	14	48	♃'s first sat. will im.
15			Mercury R. A. 7h. 8m. dec. 23. 28. N.
	—		Venus R. A. 8h. 27m. dec. 14. 34. N.
	—		Mars R. A. 8h. 7m. dec. 21. 23. N.
	—		Vesta R. A. 20h. 32m. dec. 22. 36. S.
	—		Juno R. A. 5h. 51m. dec. 14. 22. N.
	—		Pallas R. A. 15h. 26m. dec. 22. 10. N.
	—		Ceres R. A. 15h. 25m. dec. 16. 23. S.
	—		Jupiter R. A. 0h. 16m. dec. 0. 16. N.
15			Saturn R. A. 20h. 29m. dec. 19. 36. S.
	—		Georg. R. A. 0h. 24m. dec. 1. 49. N.
	—		Mercury passes mer. 23h. 40m.
	—		Venus passes mer. 1h. 5m.
	—		Mars passes mer. 0h. 33m.
	—		Jupiter passes mer. 16h. 39m.
	—		Saturn passes mer. 12h. 53m.
	—		Georg. passes mer. 16h. 47m.
	2	23	Ecliptic conj. or ● new moon
	17	15	♂ in conj. with the ☽ diff. of dec. 5. 2. N.
16	0	51	♀ in conj. with the ☽ diff. of dec. 0. 39. N.
18	13	15	♃'s second sat. will em.
19	17	19	Vesta in conj. with ♄ diff. of dec. 3. 30. S.
20			Clock before the sun, 6m. 1s.
	—		☽ rises 10h. 2m. M.
	—		☽ passes mer. 3h. 56m. A.
	—		☽ sets 9h. 36m. A.
21	5	35	☿ in sup. conj. with ☉
	18	29	☿ in conj. with ♀ diff. of dec. 7. 41. N.
22	9	13	☽ in □ or first quarter
23	4	49	♀ in inf. conj. with the ☉
	11	10	♃'s first sat. will im.
24	1	9	♃ stationary
	3	55	☿ in conj. with ♂ diff. of dec. 0. 38. N.
	9	21	☿ greatest Hel. Lat. N.
	20	16	Vesta in oppo. to the ☉, intens. of light 1·428.
25			Clock before the sun, 6m. 11s.
	—		☽ rises 4h. 27m. M.
	—		☽ passes mer. 8h. 29m. A.
	—		☽ sets Morn.
	15	51	♃'s second sat. will im.
	23		☽ in Perigee
26	11	35	♄ in oppo. to the ☉
			Occul. Sagittarii, im. 10h. 54m. em. 11h. 35m.
27			Occul x^2 Sagittarii, im. 7h. 24m. 8h. 15m.
28	11	0	♀ in Aphelion
	23	54	♄ in conj. with the ☽ diff. of dec. 4. 45. S.
29	2	33	Ecliptic oppo. or ○ full moon
			Occul. z^3 Aquarii, im. 11h. 1m. em. 11h. 53m.
31			Juno greatest Hel. Lat. S.

J. LEWTHWAITE, Rotherbithe.

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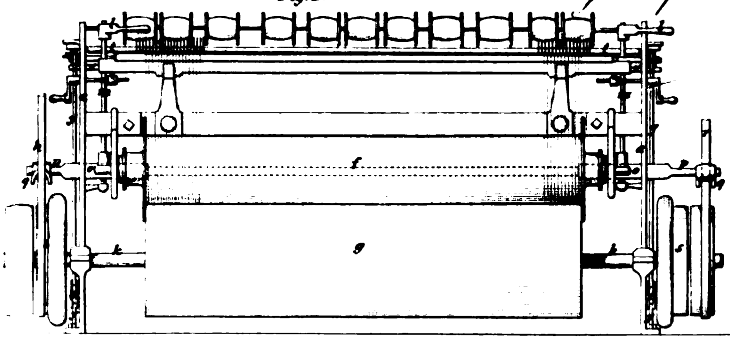
Fig. 1.



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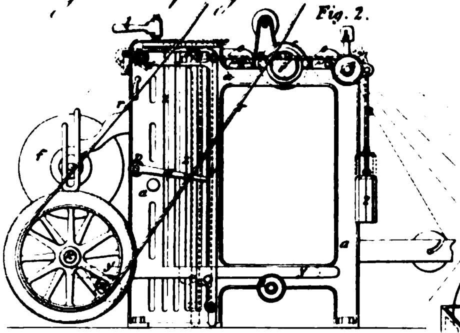

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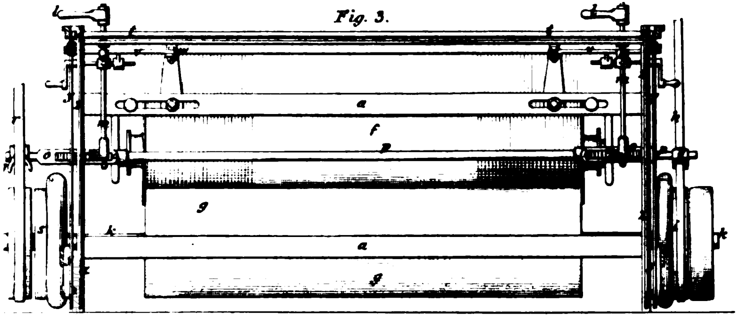

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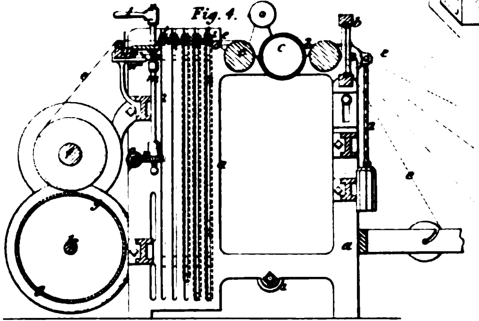

Poole's electrical battery.

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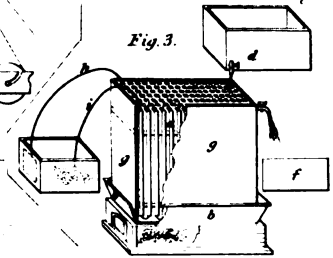

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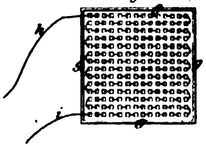

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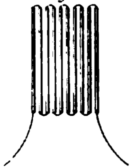
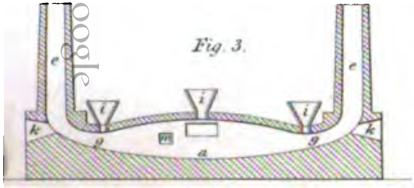


Welch's furnace for smelting copper ore.

Fig. 3.



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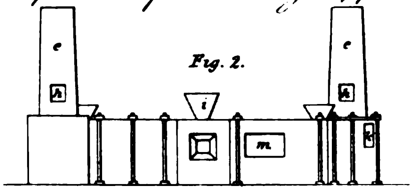

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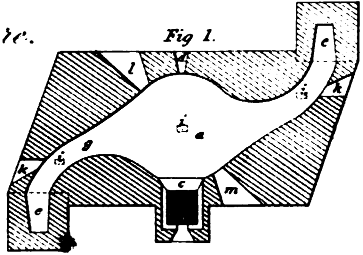

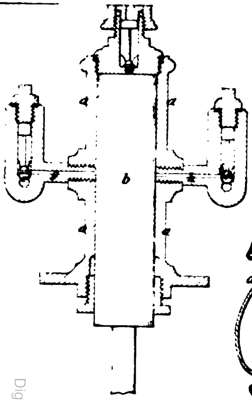

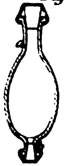
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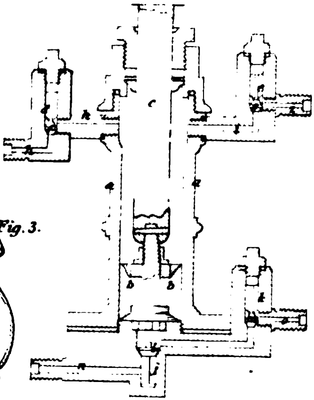

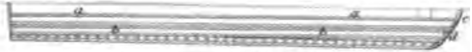

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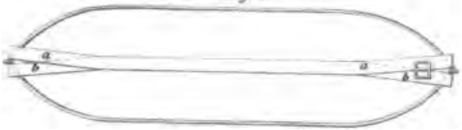

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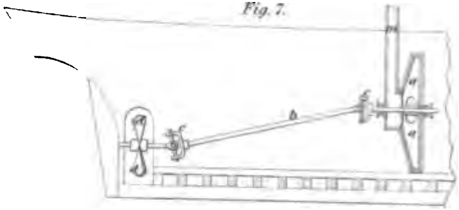

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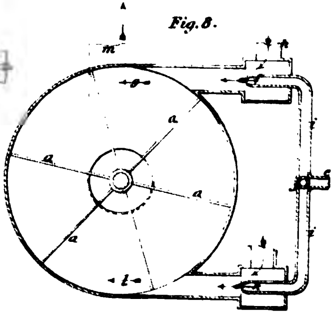
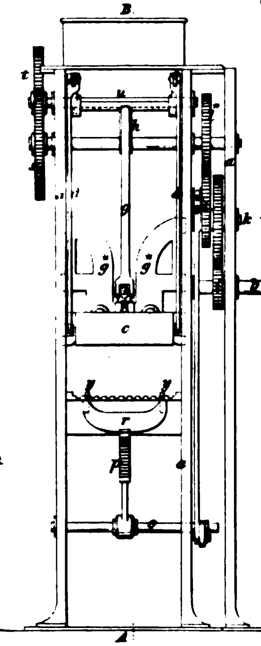


A. V. Newton del.

1st Feby 1844.

T. Sherratt sc.

Betts & Taylor's mach.^e for making bricks.



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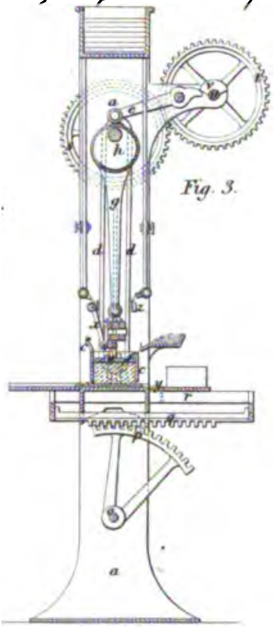

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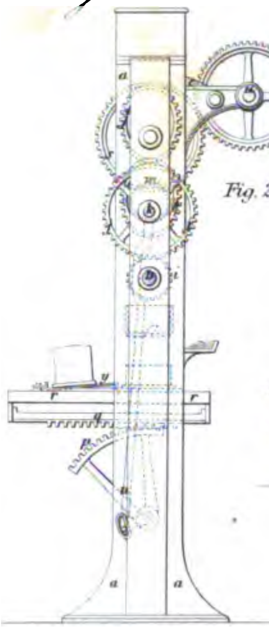

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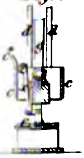

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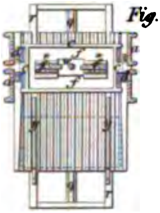
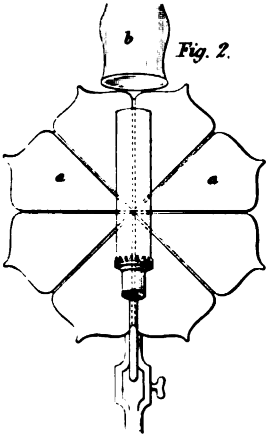


Fig. 4.

Mechi's imp.^ts in lamps.



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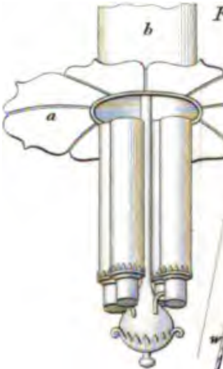

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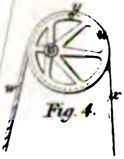
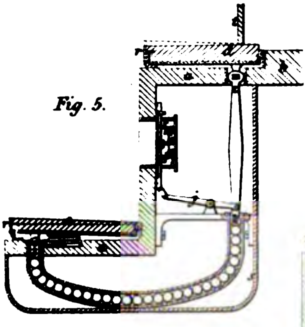


Fig. 4.

Ranwell's registering app.^ts



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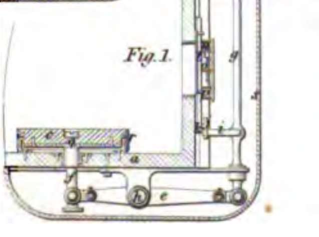

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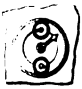

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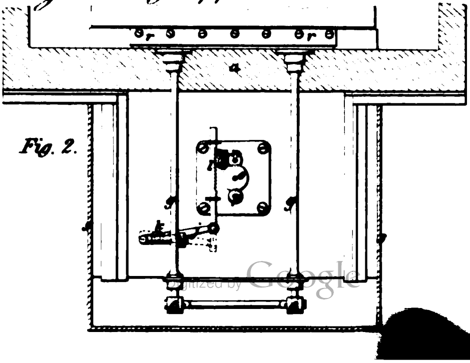
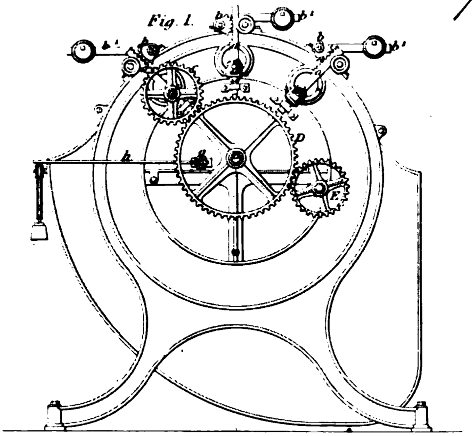


Fig. 2.

Roberts's mach.y for fulling cloth.

Fig. 1.



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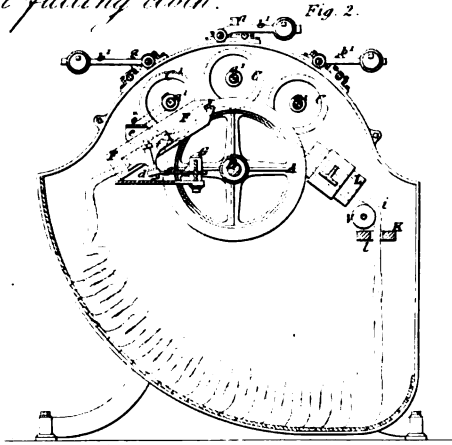

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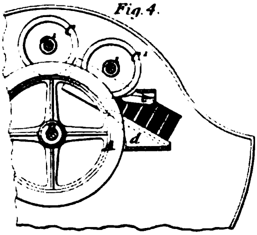

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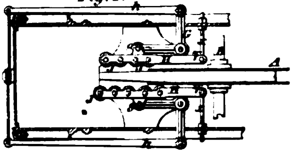

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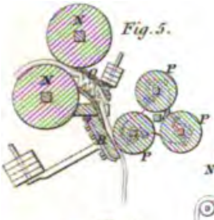

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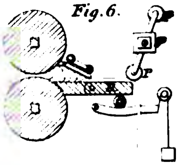

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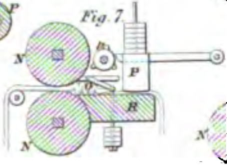

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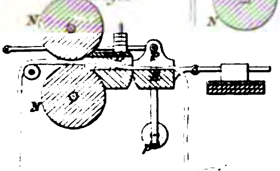

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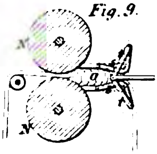
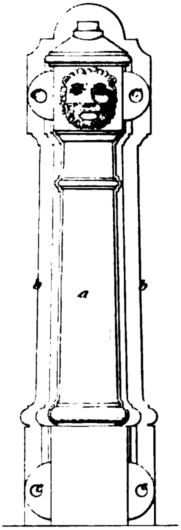


Midworth's imp.d street plu

Fig. 1.



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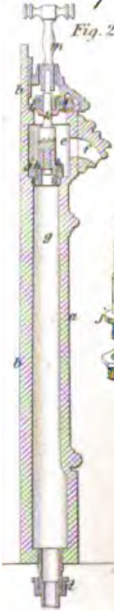
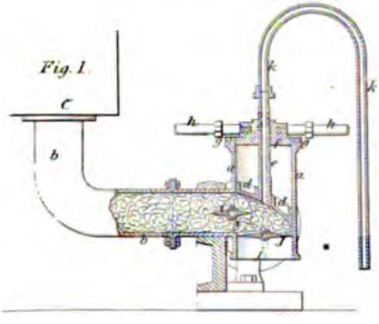


Fig

Brewer's mach.y for manufact.g paper.

Fig. 1.



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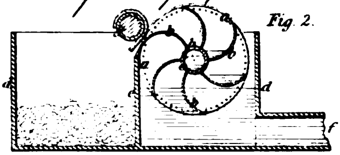

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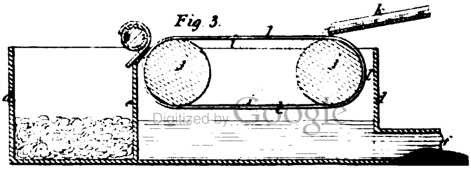
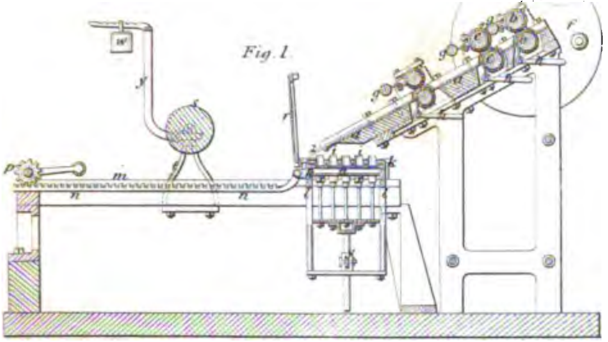


A.J. Newton del.

1st March 1844.

Drew's machinery for making lozenges.

Fig. 1.



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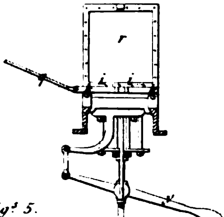

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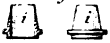

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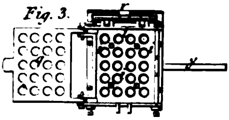

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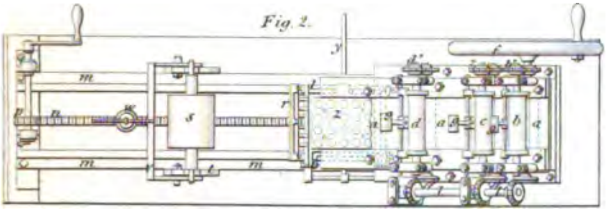

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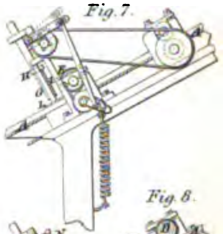

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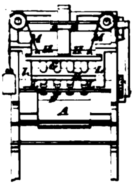

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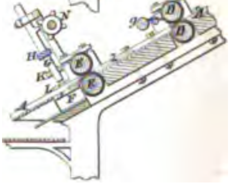
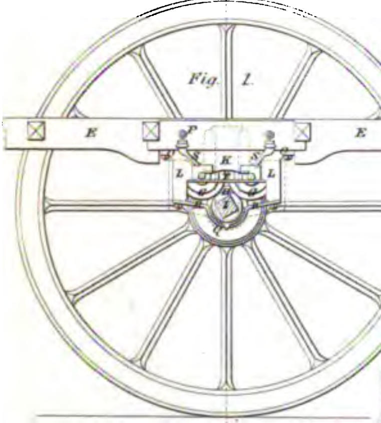


Newton's impts. in axletrees.

Fig. 1.



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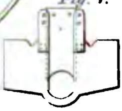

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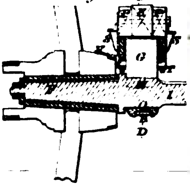

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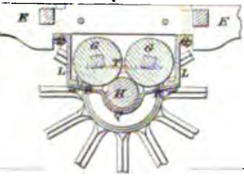
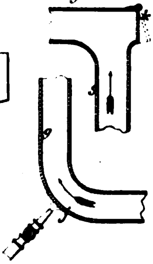


Faraday's impts. in gas burners

Fig. 2.



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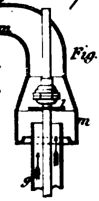

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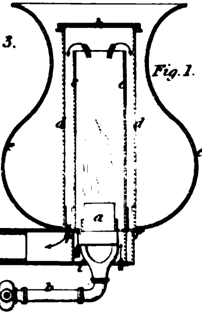
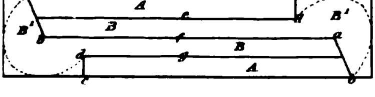


Williams' impts. in covering roofs.

Fig. 1.



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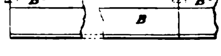

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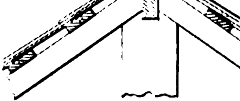

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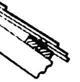

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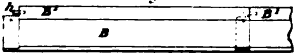

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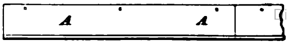

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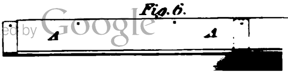
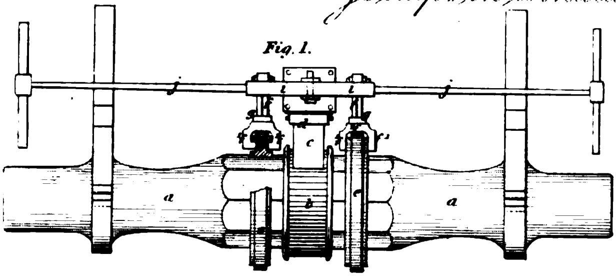


J.V. Newton del. 1st March 1844.

Betteley's imp.ts in windlasses.

Fig. 1.



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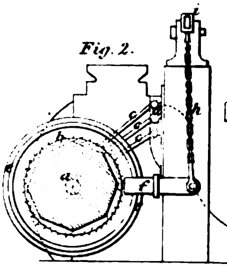

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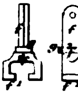

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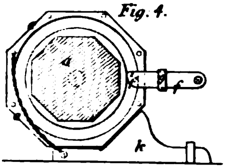

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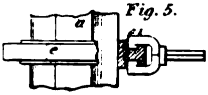
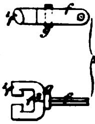


Fig. 6.



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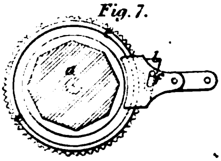

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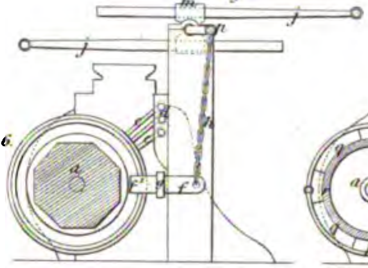

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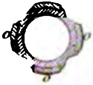

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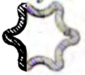
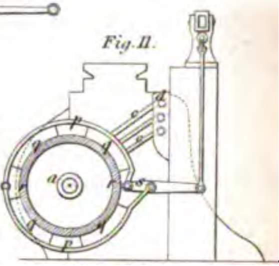


Fig. II.



Sleigh's imp.d sea barrier.

Fig. 1.

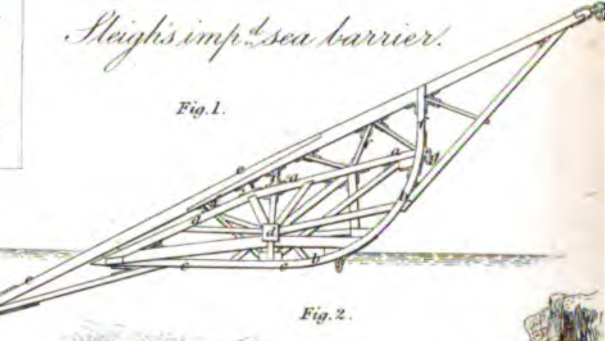
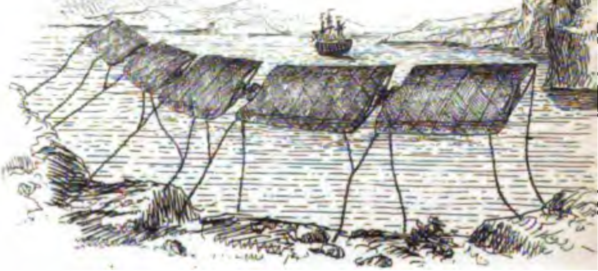


Fig. 2.



Robinson's imp.ts in making shot.

Fig. 3.

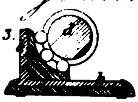


Fig. 2. A

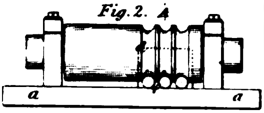
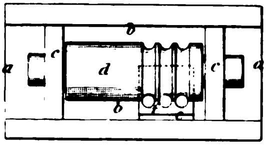


Fig. 1. B



Ritter's app.ts for crystalliz.g & purify.g sugar

Fig. 1

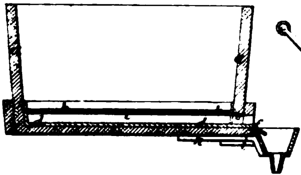


Fig. 3.

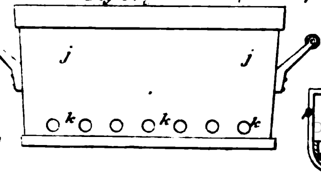
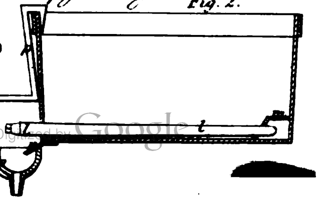


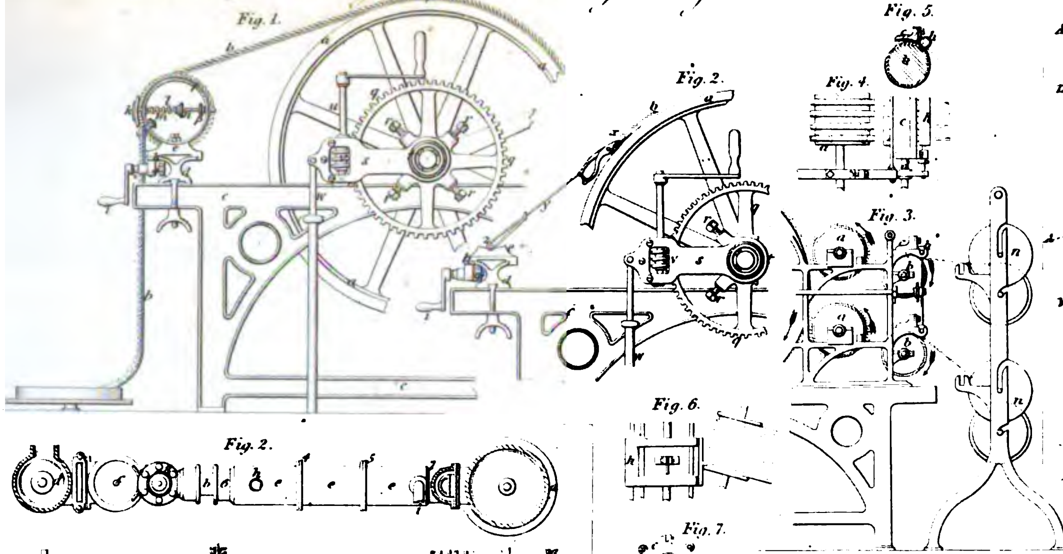
Fig. 2.

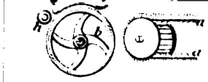


I.V. Newton. del. et Sc.

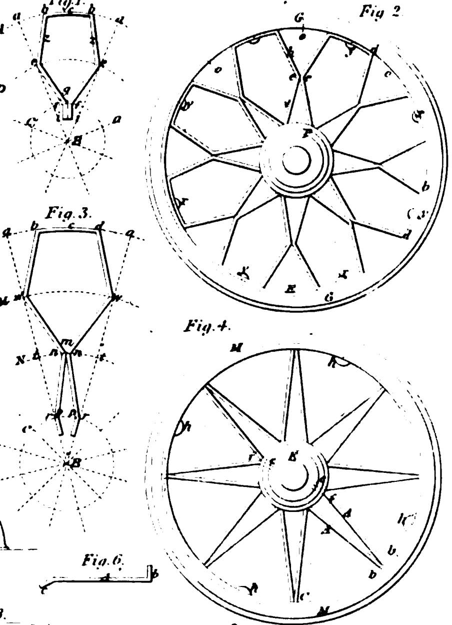
1st March 1844.

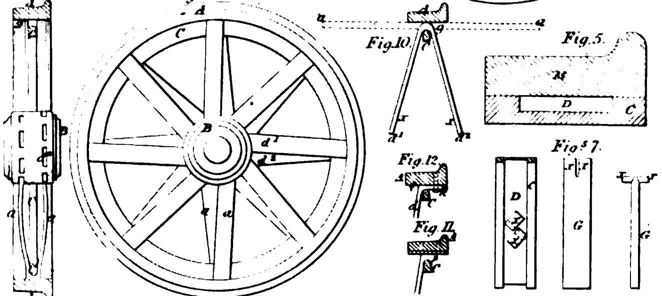
Lister & Budding's imp^ts in covering card cylinders.



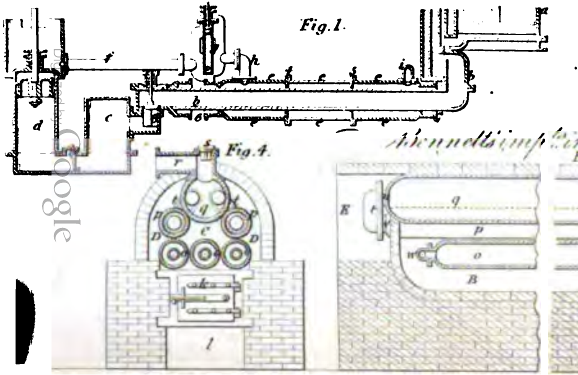


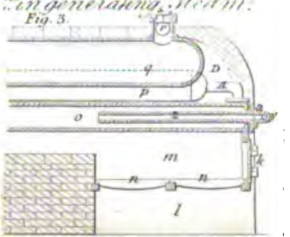
Haddan & Hawkes's railway wheels.





Kennell's imp^ts in generating steam:





Irving's impd. drill.

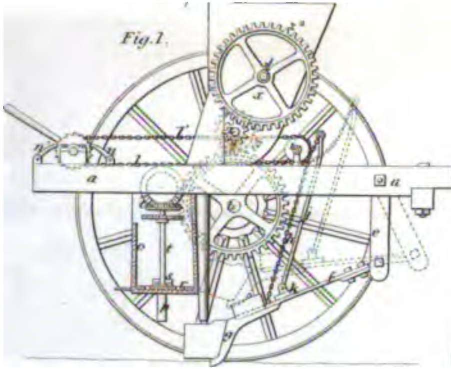
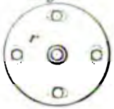


Fig. 1.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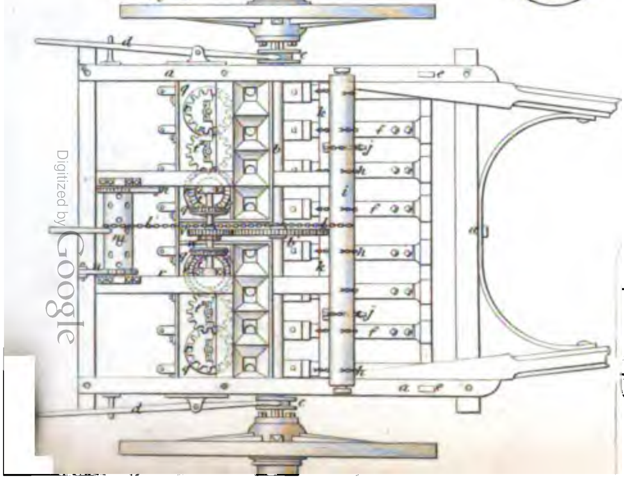
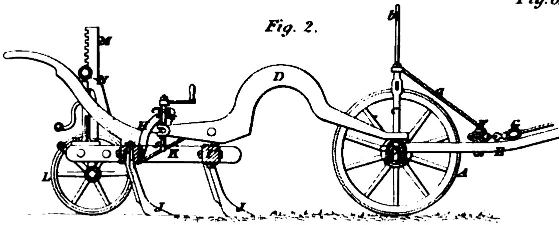


Fig. 2.

Newton's machy. for tilling land.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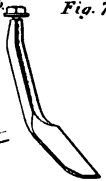
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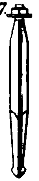
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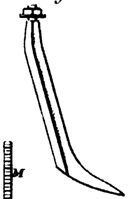
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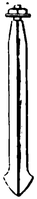
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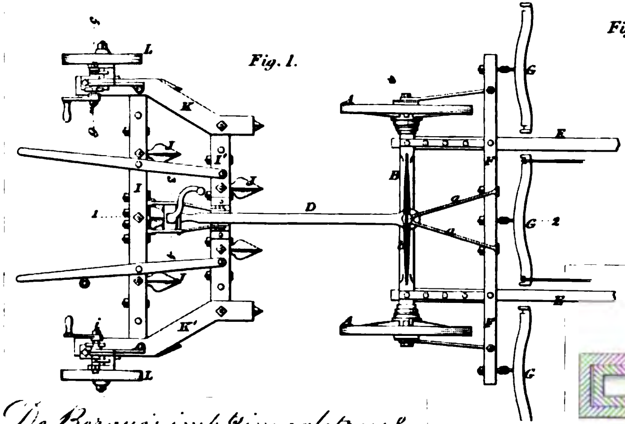
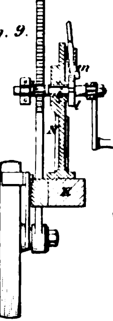


Fig. 1.

Fig. 8.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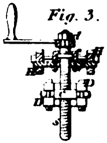
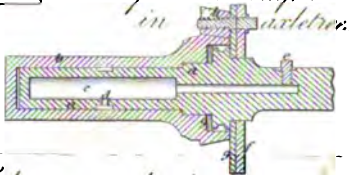
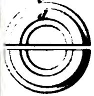


Fig. 3.

Wolferstan's impts. in axletrees.



De Bergue's impts. in axletrees, &c.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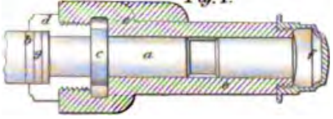
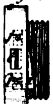


Fig. 1.

Gibson's impd. axle bar, &c.

Fig. 3.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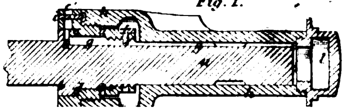
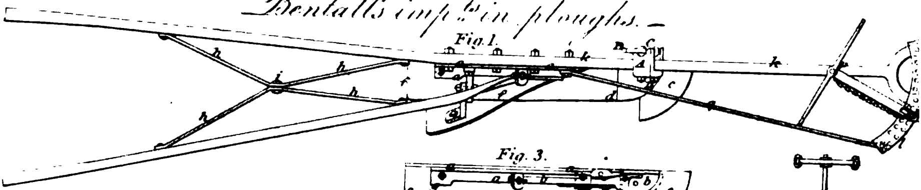


Fig. 1.

Bentall's imp.ts in ploughs.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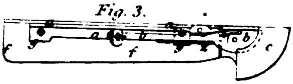
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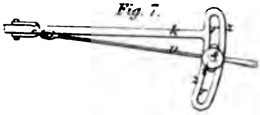
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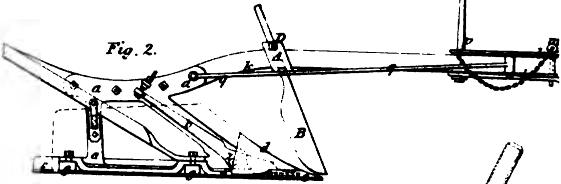
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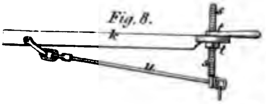
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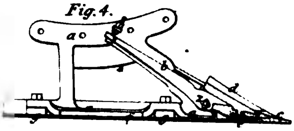
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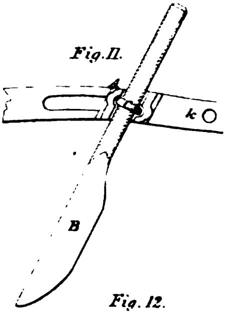
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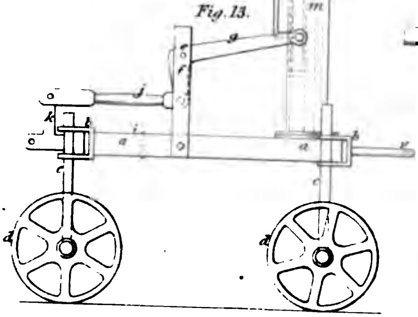
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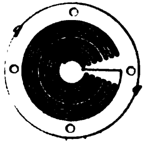
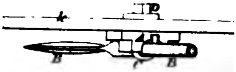


Fig. 16.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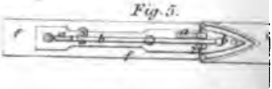
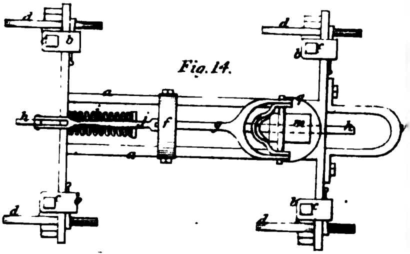


Fig. 5.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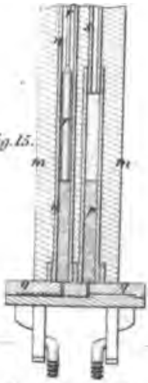
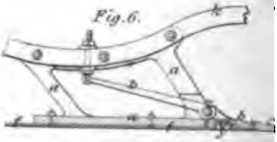


Fig. 15.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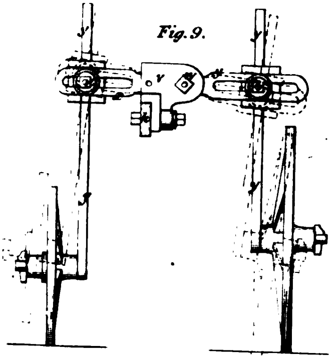
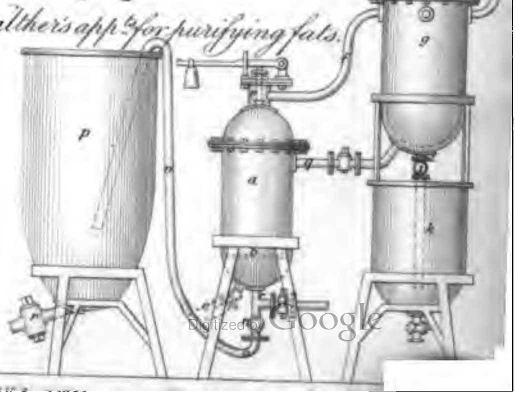


Fig. 9.

Walther's app.s for purifying fats.



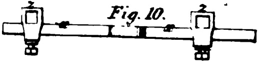


Fig. 10.

A.V. Newton del.

rarth, &c.?

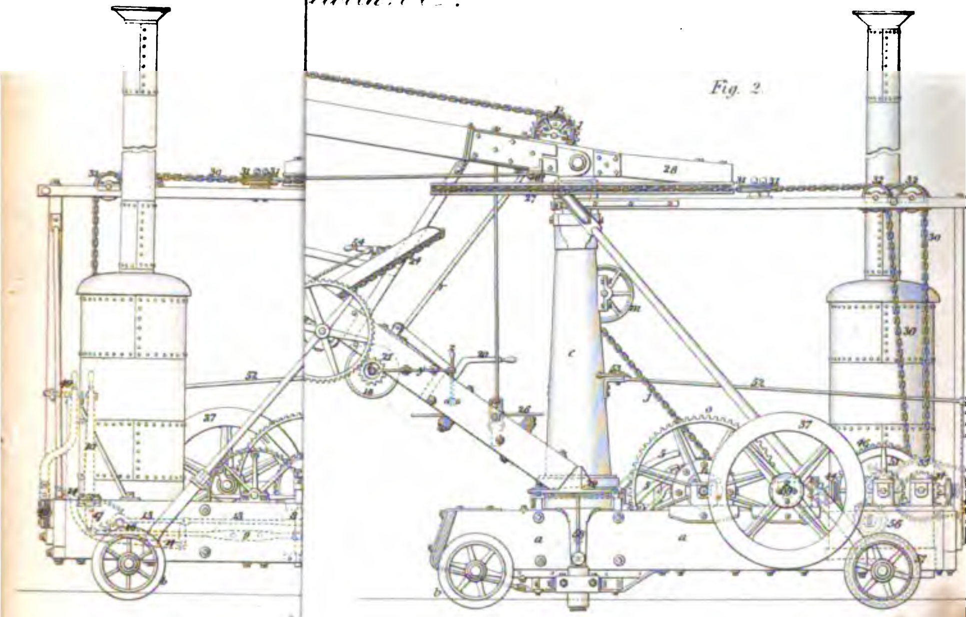
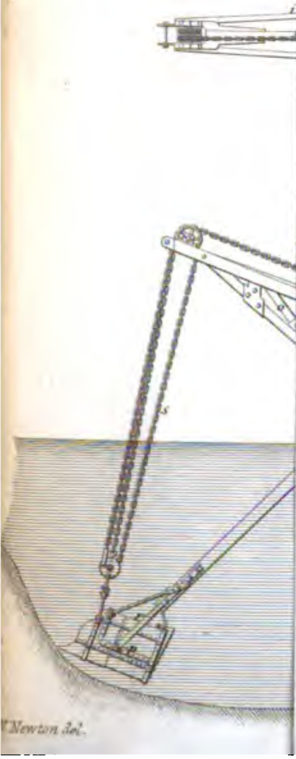


Fig. 2.



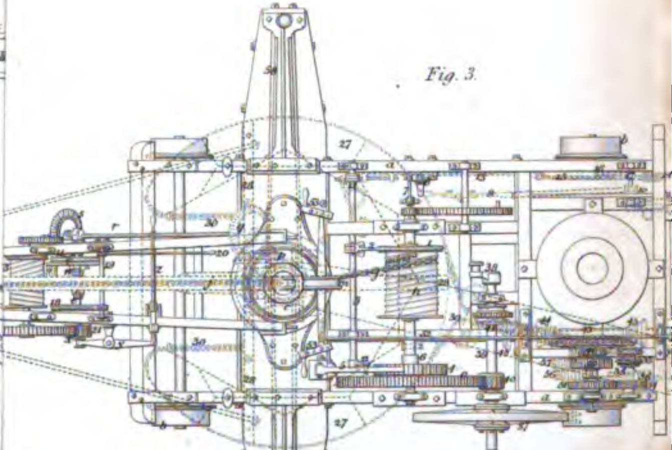
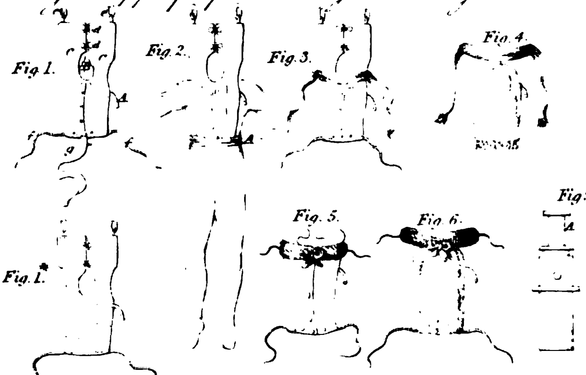


Fig. 3.

W. Newton del.

Pigot's app^ts for preventing drowning.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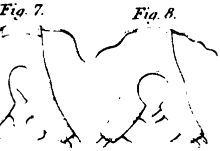


Fig. 7. Fig. 8.

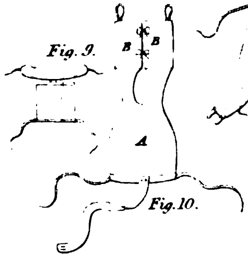


Fig. 9. Fig. 10.

Freeman's imp^d card cas

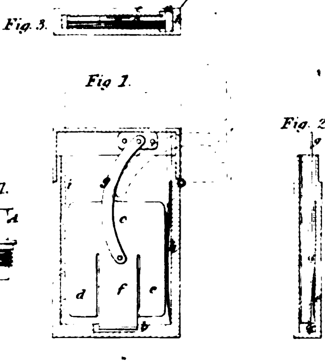


Fig. 3. Fig. 1. Fig. 2.

Drake's imp^ts in lining walls—

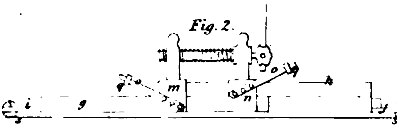
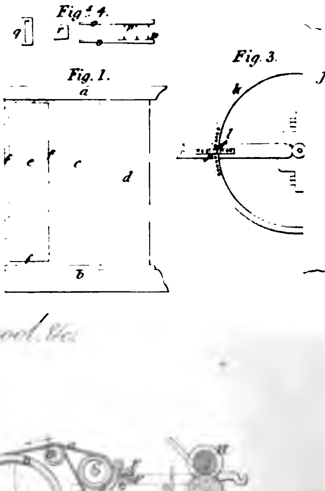


Fig. 2.


Fig^s 4. Fig. 1. Fig. 3.

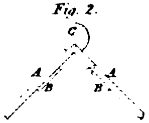


Fig. 2.

Davey's slate roofing.

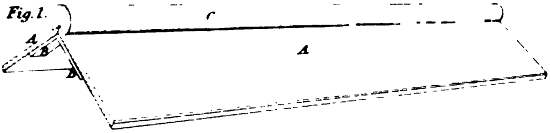


Fig. 1.

Sparkes machinery for carding wool &c.

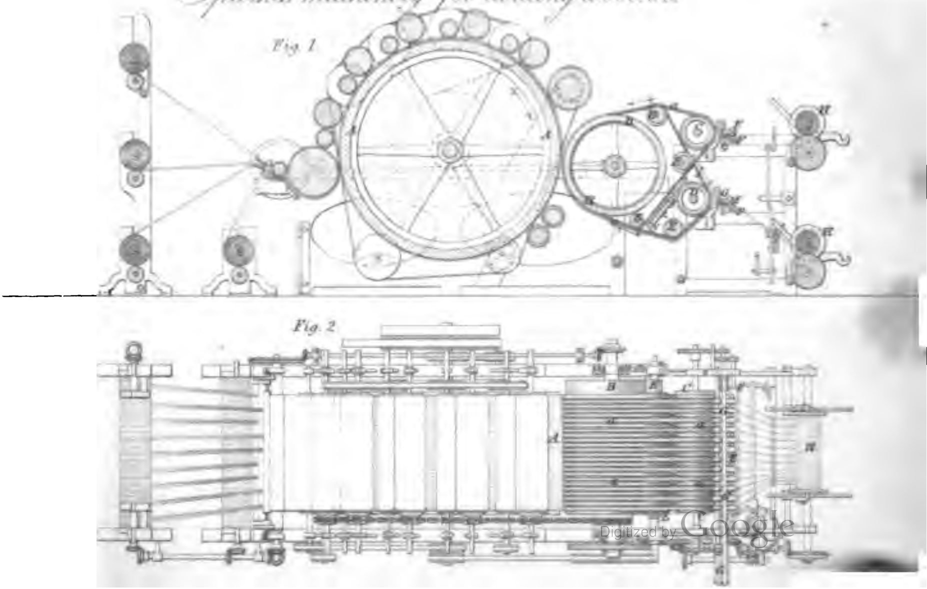


Fig. 1. Fig. 2.

Denley's impts in fireplaces & flues.

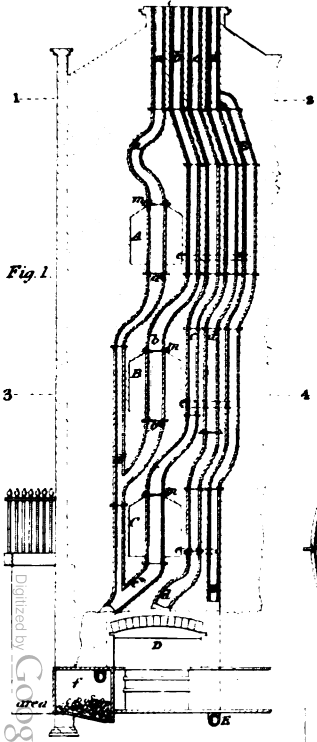


Fig. 1.

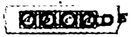


Fig. 2.

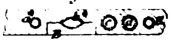
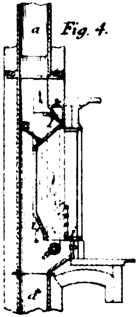


Fig. 3.



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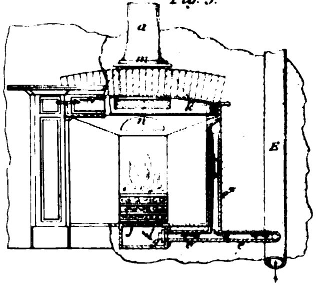
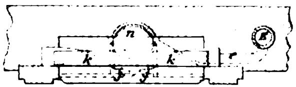


Fig. 5.



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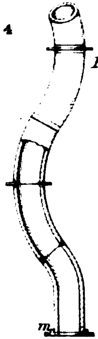

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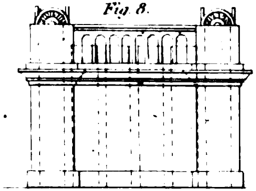
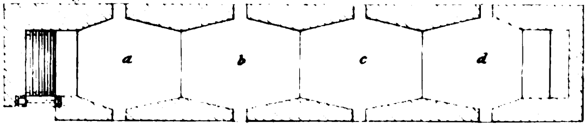


Fig. 8.

Longmaid's impd furnace.



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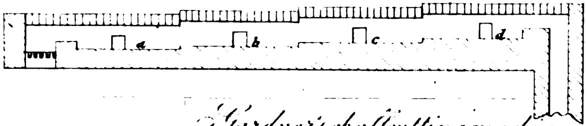
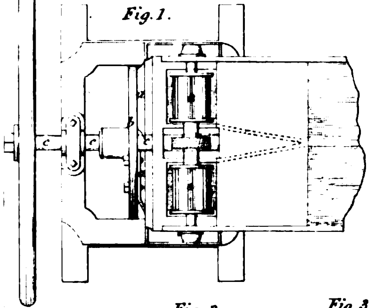


Fig. 2.

Gardner's chaffcutting machine.



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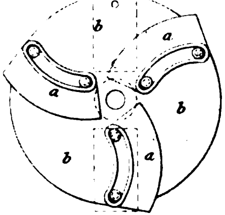

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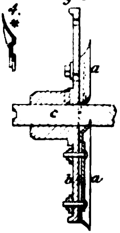
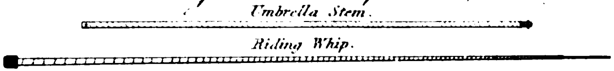


Fig. 3.

Davidge's substitute for whalebone.



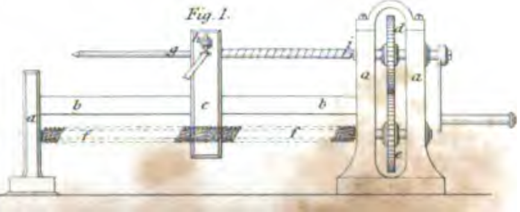


Fig. 1.

Fig. 3.

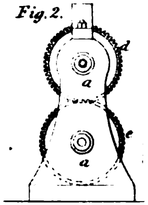
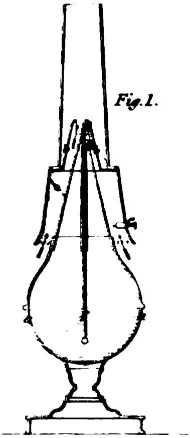
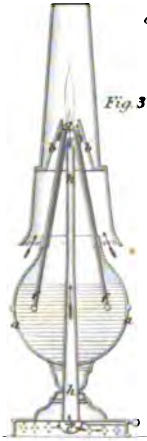
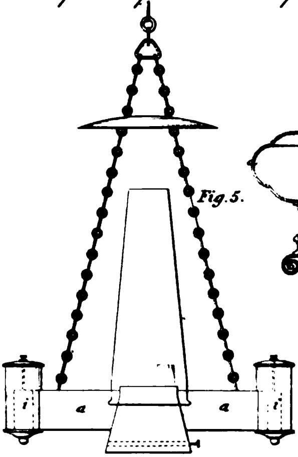


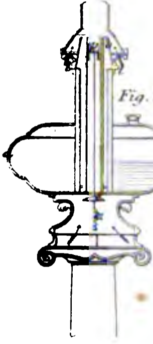
Fig. 2.

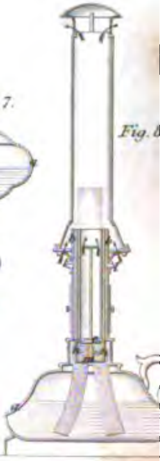
Kurtz's impd. naphtha lamps

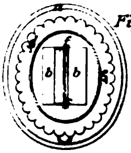


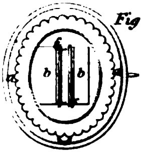


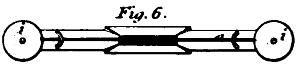


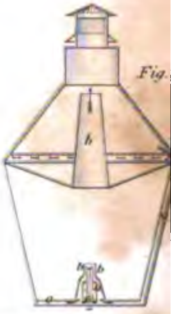




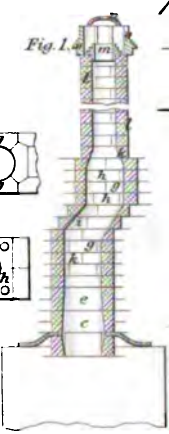


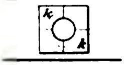


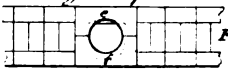


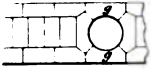


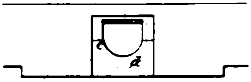
Moon's impts. in chimneys & flues.

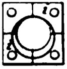


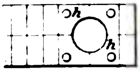


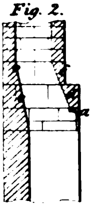


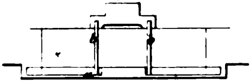


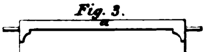


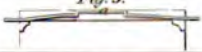


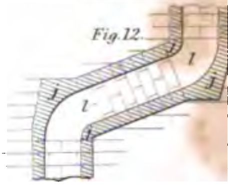


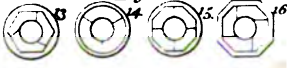




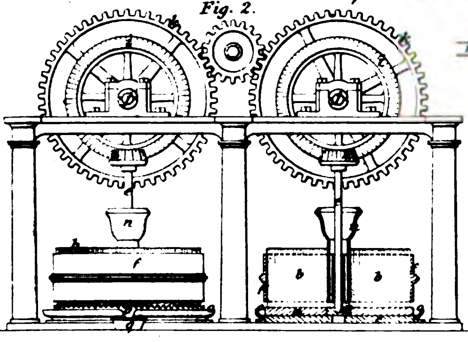


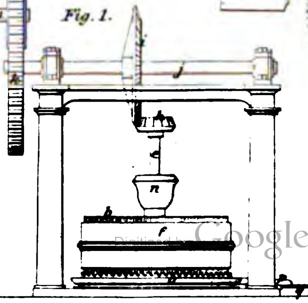


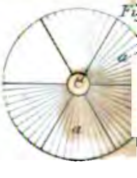


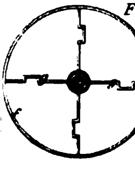


Bessemer's machy. for making bronze powder.









Smith's mach^y for carding & spinning cotton.

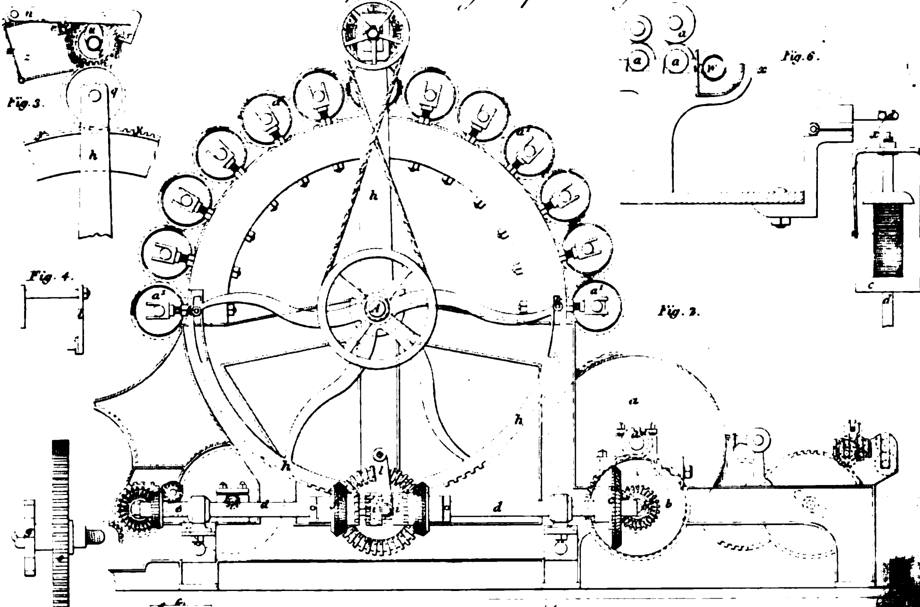
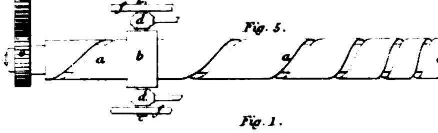


Fig. 3.

Fig. 4.

Fig. 6.

Fig. 2.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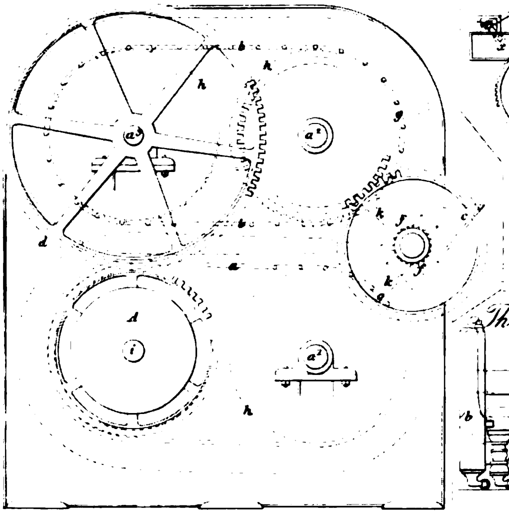


Fig. 1.

Marsden & Robinson's imp^ts in

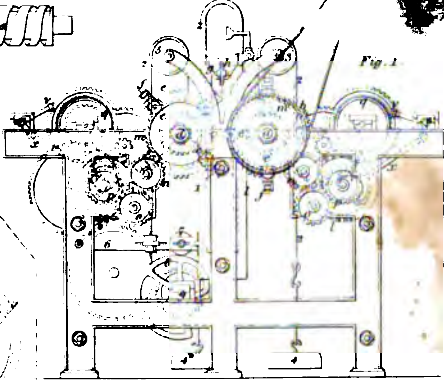
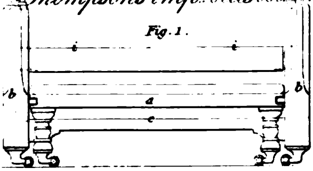


Fig. 1.

Thompson's imp^d bedstead.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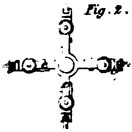
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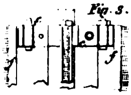
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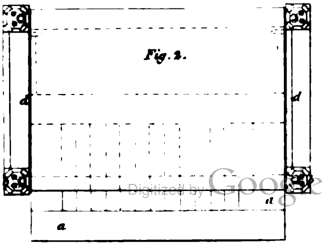
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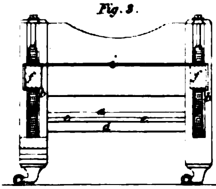
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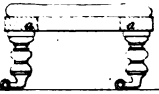
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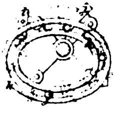
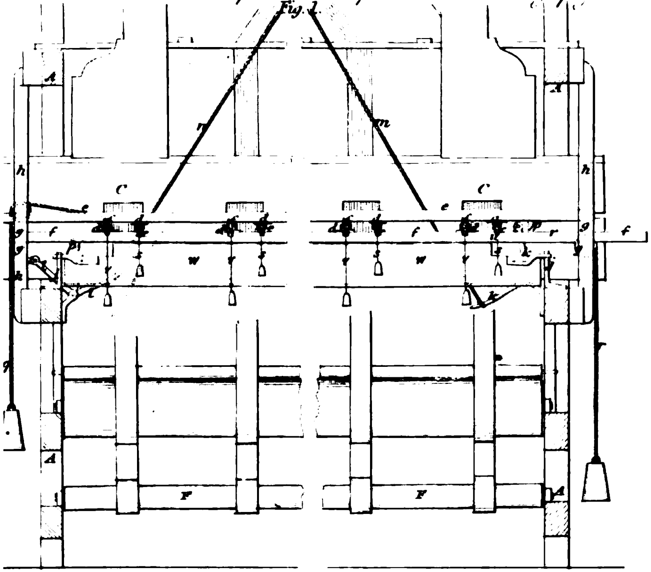


Fig. 4.

Thompson's imp.ts in weaving figured fabrics.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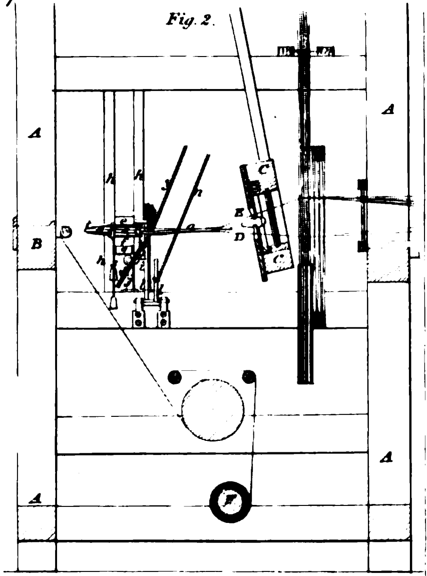
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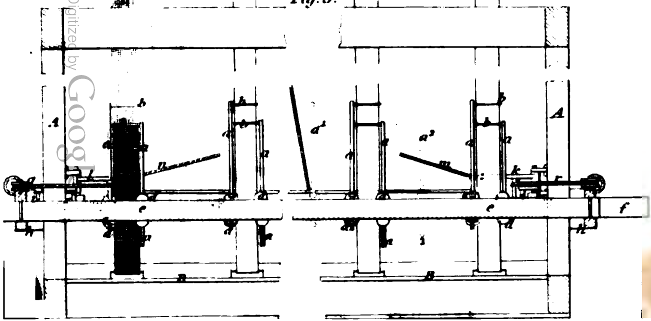
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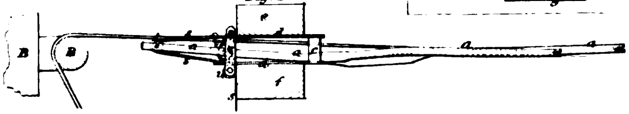
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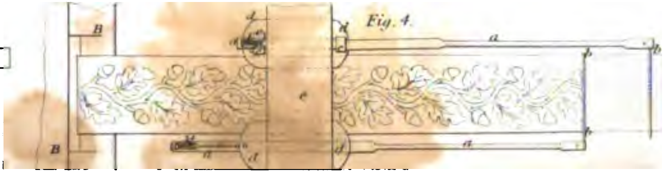
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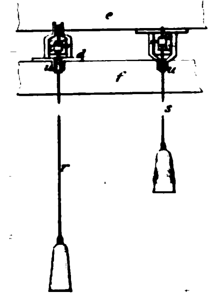
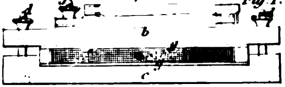


Fig. 6.

Mordaunt's imp.ts in moulding.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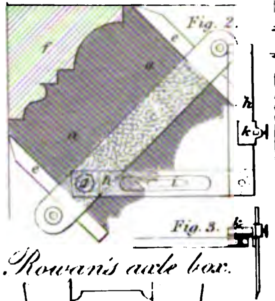
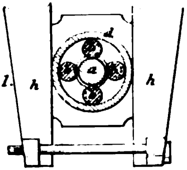


Fig. 2.
Fig. 3.

Rowan's axle box.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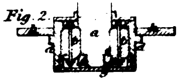
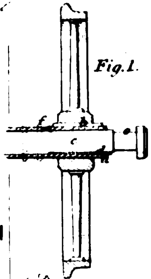


Fig. 2.

Briggs' imp.ts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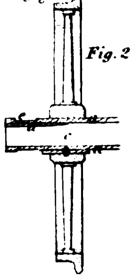
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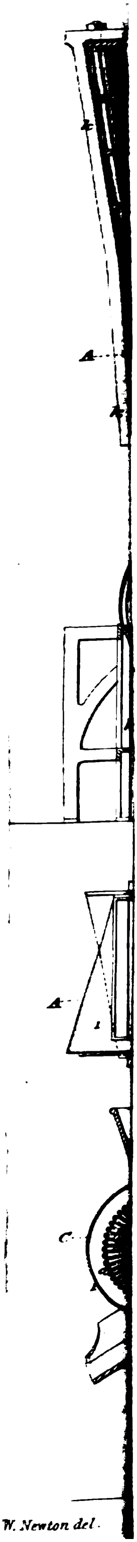

W. Newton del.

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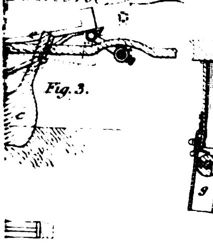

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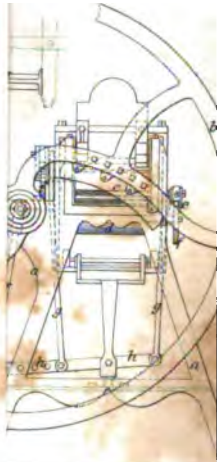
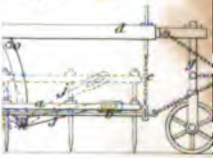


ts imp.d harrow

Fig. 2



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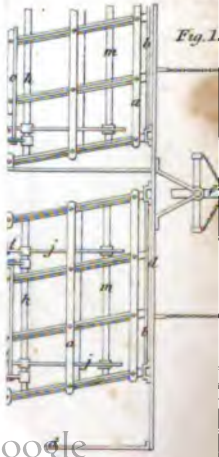
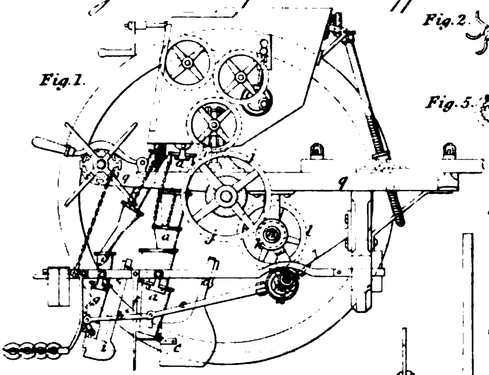


I. S

Garrett's impd drill, chaffcutter & thrashing machine

Fig. 1.



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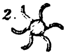

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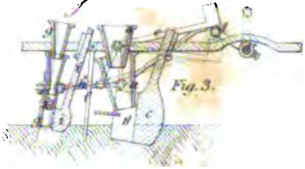

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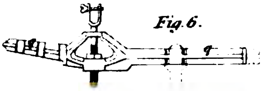

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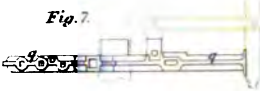

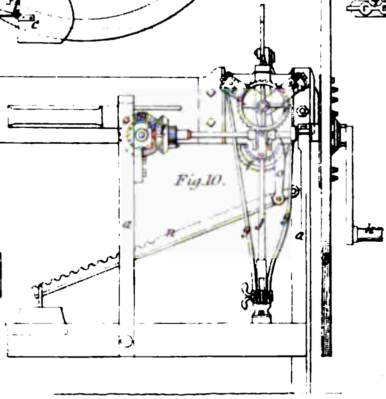

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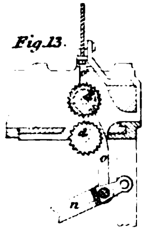

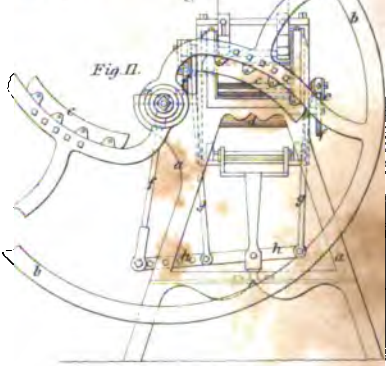

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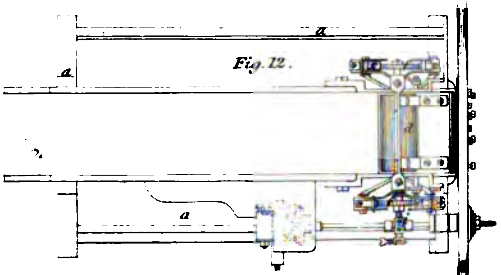

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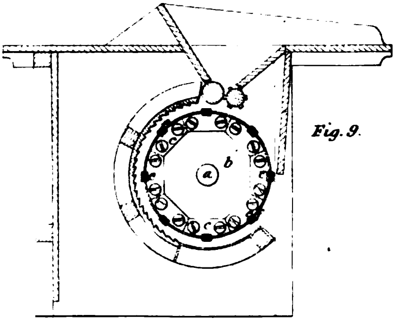

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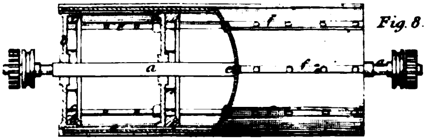


Grant's impd harrow

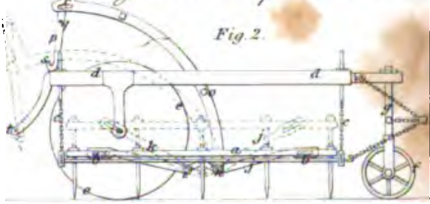
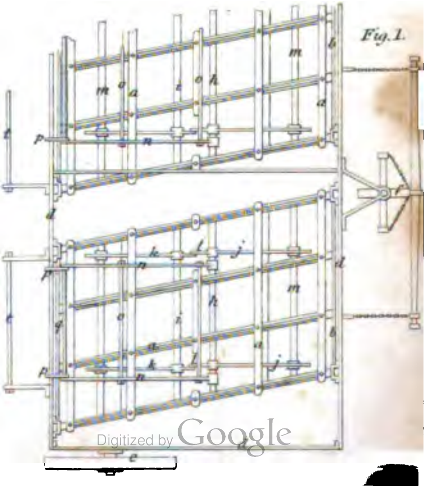


Fig. 1.



Beard's imp^ts in calico printing.

Fig. 2.

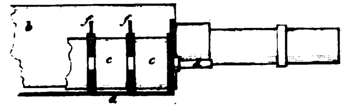


Fig. 1.

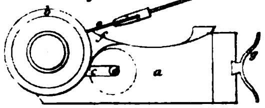
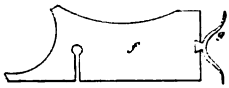


Fig. 3.



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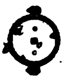

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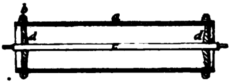
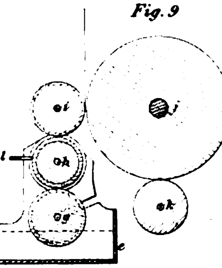


Fig. 9



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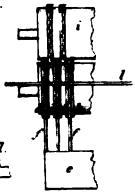
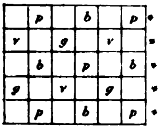


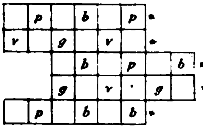
Fig. II.

Fig. 4.



p		b		p
v	g	v		
b		p		b
g		v		g
p		b		p

Fig. 5.



p		b		p	
v	g	v			
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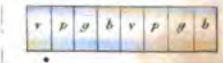
	g	v		g	
p		b		b	

Fig. 6.



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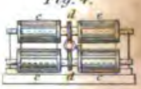


Gardner's imp^d chaff-cutter.

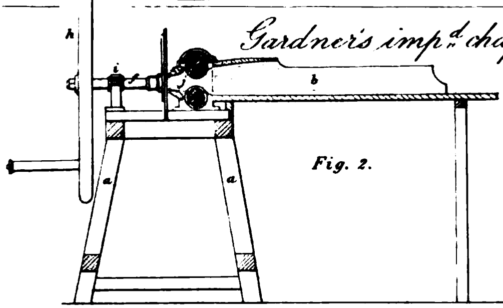


Fig. 2.

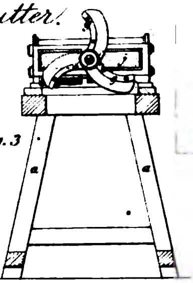
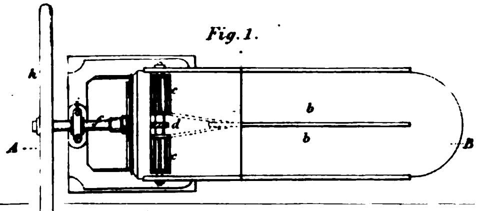


Fig. 3

Fig. 1.



Bush's imp^ts in magnetic needles.

Fig. 1.

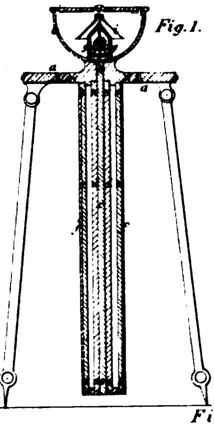


Fig. 2.

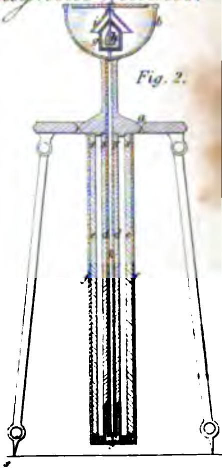
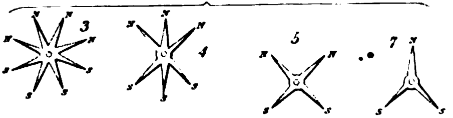
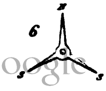
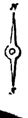


Fig.







Newton's imp^d fire-bars.

Fig. 2.

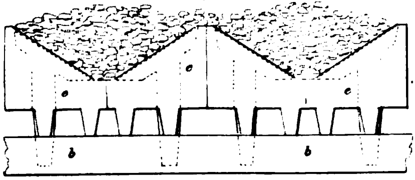
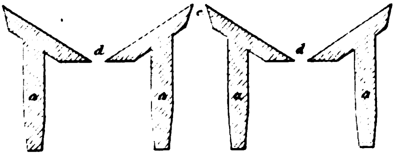


Fig. 3



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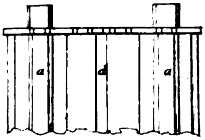

Fig. 5.

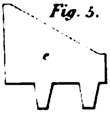

Fig. 1.